Welding Design & Fabrication

ESTABLISHED IN 1930 AS INDUSTRY & WELDING

OCTOBER 1959

Heat Treating Low-Alloy High-Tensile Steel Weldments

contents page 3

WIR
ANN ARBOR MICH
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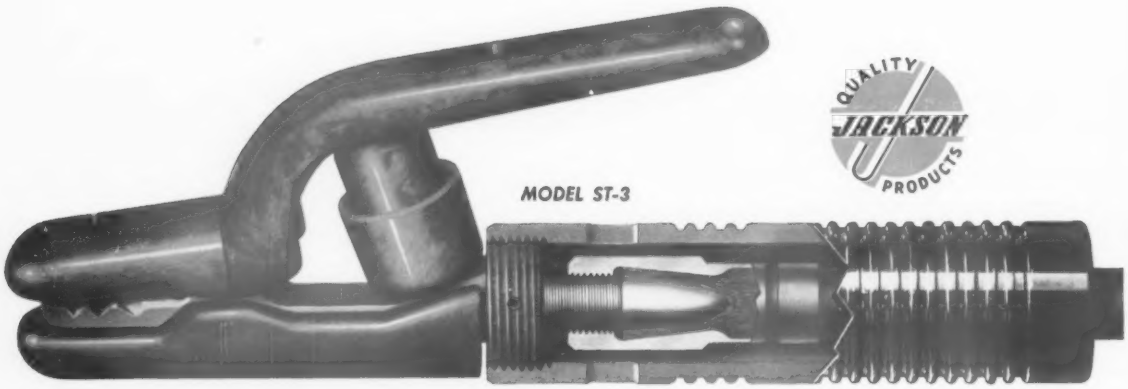
PUBLISHED BY THE INDUSTRIAL PUBLISHING CORPORATION

The magazine of welding management, production, and engineering



QUALITY JACKSON PRODUCTS

new . . . Sealed Tight

JACKSON SERIES ST electrode holders offer a *Sealed Tight* mechanical cable connection that gives you practically one-piece conductivity between cable and holder. Tongs are of heat-treated 98% copper alloy.

The stripped cable strands are completely *Sealed Tight* within a *connection nut*, making all-around *tight* metal-to-metal contact with the holder tong, *sealed* against moisture and dirt. The cable jacket is also *Sealed Tight*. The connection nut, by providing an all-around *tight* support of the cable jacket, allows no strain on the cable strands which usually occurs through flexure and tension.

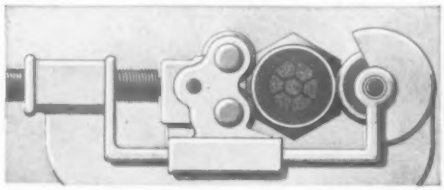
This cable connection is quick and lasting, requiring no maintenance during the normal life of copper or aluminum cable.

Large, ventilated handle threads onto a non-conductive asbestos bushing, has no direct metal contact with tong or cable connection, resulting in an extremely cool working holder.

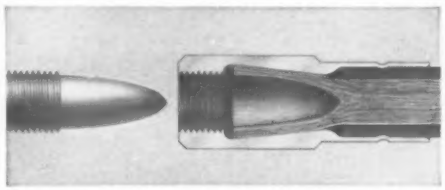
Should the "stinger end" of the holder require service of any kind, it may be quickly replaced without disturbing the actual cable connection. This important feature greatly reduces holder down-time and effects savings in cable cost.

Copper alloy lower jaw terminates in a point, silver-plated for greatest conductivity. When nut is tightened, cable strands are equally disposed around this point, *Sealed Tight*.

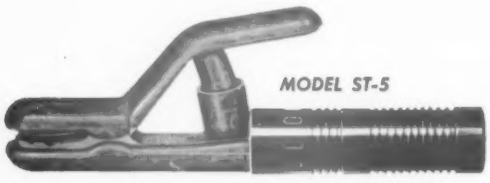
The nut extends backward, forming a ferrule around the cable jacket. This *Sealed Tight Connection Nut* is made in sizes to fit cables No. 1, 1/0, 2/0, and 3/0.



For a *truly permanent nut-to-cable connection*, the ferrule of the nut is crimped around the cable jacket, using Jackson's inexpensive, fast-acting crimping tool.



Detachable Stinger feature enables the operator to detach the "stinger end" by unscrewing it from the connection nut. The cable strands stay in place inside the nut.



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- ***MADE IN TWO SIZES . . .***

Model ST-3, "Sealed Tight" Insulated Copper Alloy Holder Electrodes through ¼" • 300 Amps • 10" long

Model ST-5, "Sealed Tight" Insulated Copper Alloy Holder Electrodes through ⅜" • 500 Amps • 11½" long

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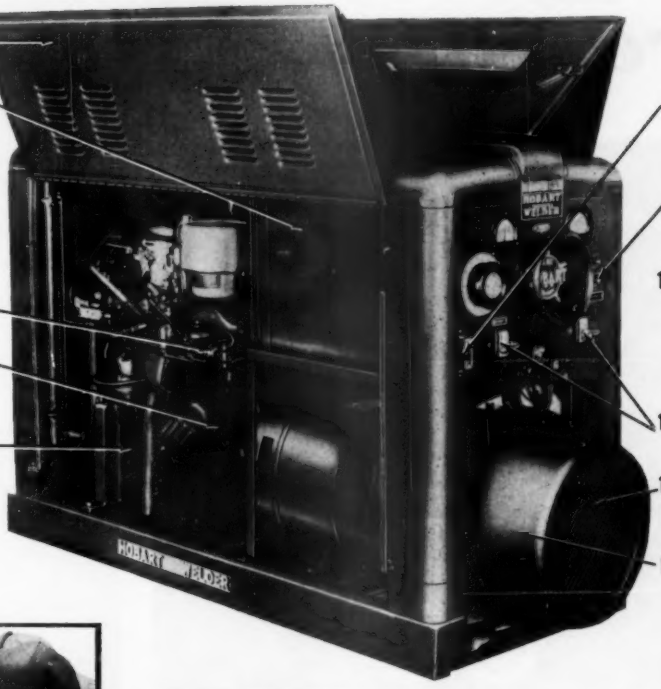
2. **LARGE 25 GALLON FUEL TANK** permits extended operations. Fuel pump and fuel level gauge are standard equipment.
3. **CHOICE OF IGNITION:** either magneto with hand crank, or battery self starting systems available.
4. **AUTOMATIC IDLING DEVICE** saves gas.
5. **LONG LIFE FLEXIBLE STEEL COUPLING** has no rubber or fabric to deteriorate.
6. **ENGINE:** Dependable, economical power is supplied by the world famous water cooled 4-cylinder Willys Jeep engine. A diesel engine is also available if desired.



7. **LIGHTWEIGHT** permits quick movement from job to job.
8. **POLARITY SWITCH** lets you quickly change from straight to reverse polarity without danger of burnouts.
9. **110 VOLT DC** outlet supplies 1 KW power to operate lights and tools at the job.
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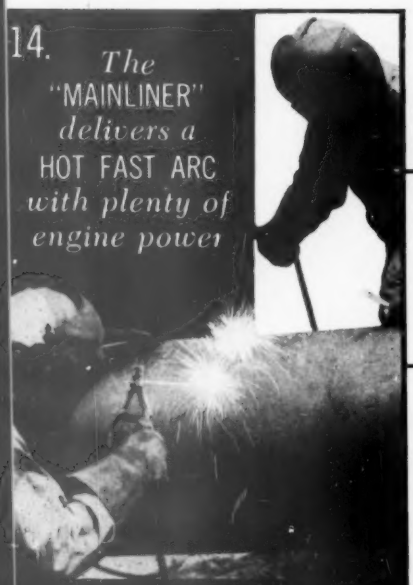
11. **REINFORCED** welding and ground cable terminals.
12. **CONTROLLED COOLING** of all generator parts insures long, trouble-free life.
13. **250 AMP. HOBART BUILT GENERATOR** provides exceptional arc stability in all ranges—helps you do better, faster work under all conditions.

14. *The "MAINLINER" delivers a HOT FAST ARC with plenty of engine power*



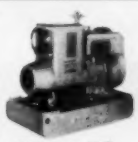
The "Mainliner" can't be beaten for fast, economical field operations. Here two weldors team up to get a pipeline job done in half the time.

THE NEW "MAINLINER" is just one of the many Hobart welders that is designed to meet exacting requirements. An extremely wide variety of models in many capacities is available to exactly answer your welding needs.

200 amp. AC Power/DC Welder Combination

300 amp. DC Welder with 6 or 12 KW AC power

300, 400, 600 amp. Gas Drive Welders



200 amp. DC "Husky Boy"

400, 600 amp. Self-Propelled "Big Wheeler"

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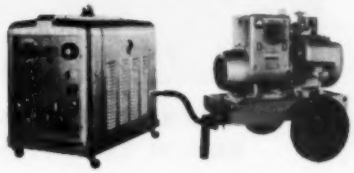
Here's an ideal combination that lets you do Tig Welding in the field. The Hobart PowerPak connected to the AC/AC power unit gives you all the necessary controls for welding aluminum and special metals by the Tig process.

The lightweight PowerPak unit may be taken to the work and used 100 feet or more from the generator. You can weld in hard-to-get-to locations, without making standard power line connections.



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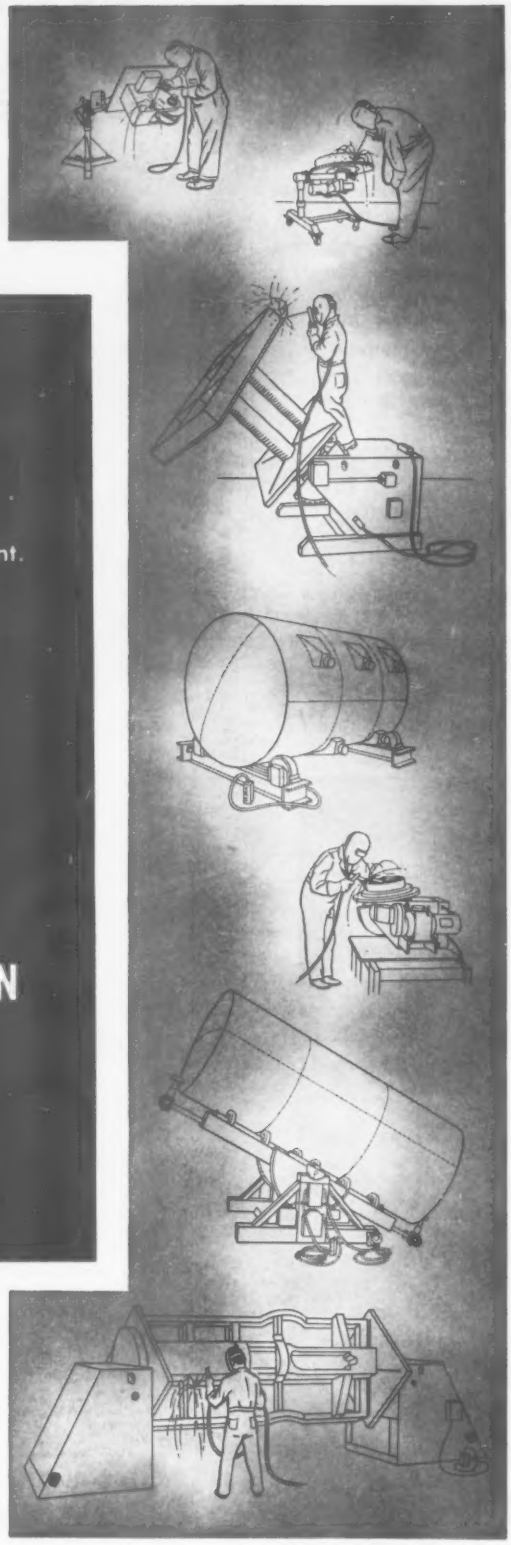

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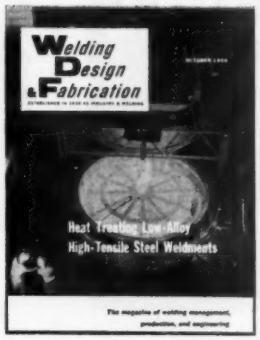

for October, 1959

COVER: After welding and stress relieving, rocket engine case made by Solar Aircraft Co., San Diego, from an air-hardenable, 5-percent chromium steel is heat treated in a giant pit furnace at 1900°F. Hoist is hooked to top of case and it is raised from furnace. See page 44 for details.

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200, 300, 400 and 500 Amperes
230/460 Volts
60% Duty Cycle

Silicon diodes in the three-phase, full-wave rectifier are the heart of the WS welder. These diodes have a capacity far in excess of the rating for the welder and are hermetically sealed against dust, oil, water and acid fumes by a new bonding process. Each diode is thoroughly tested before and after insertion in the bridge.

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Rectifier Welder

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- *Highest Degree of Electrical Efficiency*
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- *Extremely Low Maintenance*

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Westinghouse pioneered this completely new concept in industrial welding machines over 10 years ago. Since that time another refinement of the rectifier-type welder was achieved by Westinghouse through the use of silicon diodes. The ultimate in silicon rectifier machines is the Westinghouse Type *WS*.

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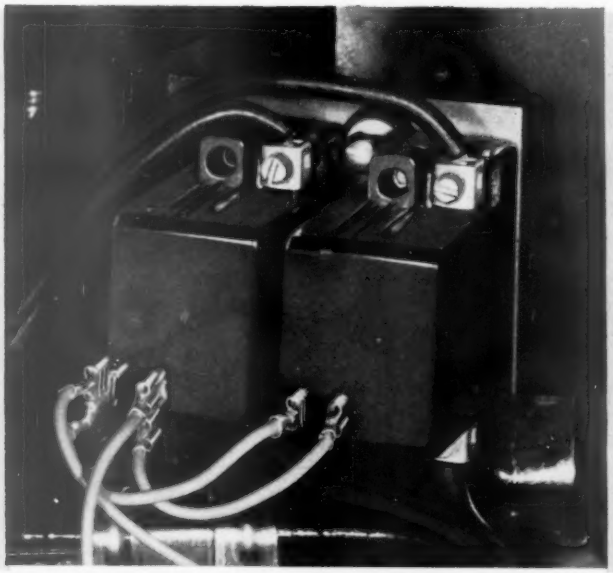
The *WS* is the lightest, smallest machine on the market. It is easy to handle and is a space saver. Its bonderized steel casing, protected by baked-on enamel, gives it a weatherproof construction. The high-quality materials in this welder will render long life and trouble-free service.

Learn more about this reliable source of power for welding!

Contact your nearest franchised Westinghouse welding distributor—or write: Welding Division, Westinghouse Electric Corporation, 4454 Genesee Street, Buffalo 5, New York. J-22150



The inverse time relay shown here allows adequate time delay for arc starting at high current setting and freedom from nuisance power interruptions—yet it protects against serious short circuit faults. Capacitors divert and store peak, high-value, short-time voltage spikes that occur when electrical current is broken.

The Type WS has virtually no moving parts to wear out; thus, replacement is at a minimum. The easy access panel shown here makes routine maintenance and air cleaning of the rectifier bridge a fast, simple operation. Be cost-wise, avail yourself of this extremely low maintenance!

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WELDING AT WORK

to do the job better and cheaper

WELDED LENGTHS of ¾-inch diameter wrought iron pipe will circulate hot water through radiant heating system.

Welded wrought iron piping

SAN FRANCISCO, CALIFORNIA: Baseball's Giants will have the only heated, open air stadium in the world. Giant officials say the first "Play Ball" was to have been shouted in new Candlestick Park late last month. Because many of the Giant's games are played at night —it is quite cool in San Francisco during summer months—a radiant heating system is being installed

Flash butt welding joins stainless tube to forged fitting

Flash butt welding is used to make arresting hooks for the Douglas F4D-1 (Skyhawk). A stainless steel tube is welded to a forging on a Sciaky BMW 4-500 machine. The tubular shafts and forged fittings are heated to a precise white-hot plasticity. Then, when they are ready to be forged, they are butted together with tremendous force. These forces of current and pressure weld the two bars into one with a strength equal to the parent stock. Each weld will withstand 300,000 pounds.

WORLD'S FIRST heated open air stadium, the new home of the National League San Francisco Giants—Candlestick Park—will have a 20,000 reserved seat section warmed by radiant heating.

helps heat San Francisco Giants' open air stadium

in the 20,000 reserved seat section. This heating system will also be used during football games.

Eagleson Engineers, San Francisco, working with John S. Bolles, architect, designed the heating system. More than 35,000-feet of welded ¾-inch diameter wrought iron pipe used is spaced on 18- to 48-inch centers and supported immediately below precast concrete seats. Headers for the combination grid and coil-type system will be placed in the aisles.

Circulating water is heated by a package-type boiler, independent of the remainder of the stadium's heating plant.

A. M. Byers, Company, Pittsburgh, furnished the corrosion-resistant wrought iron piping.

Guarantee welded stainless tanks for 20 years

PITTSBURGH, PENNA.: Stainless water softener tank is placed on automatic submerged arc welder to make final center seam weld. Previously, the tank had been tack welded at three points. Welding is done at 40 ipm using Type 308 filler wire. Finished weld is then buffed. General Ionics Corp. fabricates water softeners for the home and industry from Type 302 stainless, much of it supplied by Allegheny Ludlum Steel Corp.

General Ionics recently raised their warranty on these stainless steel tanks from 10 to 20 years.

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SIMONDS ABRASIVE CO.

DOUBLE XX

Reinforced Resinoid
Depressed Center Wheels

Fastest by far . . . of the three types of depressed center wheels that Simonds makes! Double XX is made like a conventional grinding wheel with *maximum* amount of abrasive grain — doubly reinforced for extra strength and safety. Lightweight, rigid type, for general use, especially grinding welds.

Simonds also makes Fibrex Wheels, slightly flexible, for the lighter jobs and stainless steel. Also Simex Red Wheels, extra strong for heavy duty use. Send for catalog ESA-244 describing all three.

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Proven products
Dependable know-how
Quick supply

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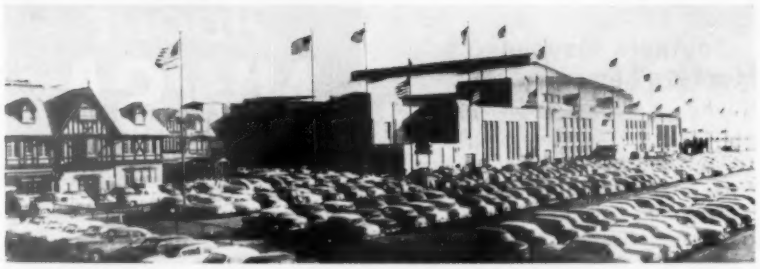
Tacony & Fraley Sts., • Philadelphia 37, Pa.
Division of Simonds Saw and Steel Co.
BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO • SHREVEPORT
SIMONDS CANADA SAW CO., LTD., GRINDING WHEELS DIVISION, BROCKVILLE, ONTARIO

For More Information Circle No. 65 on Reader Service Card.



METALS EXPOSITION will be held in International Amphitheatre.

Metal Show returns to Chicago

CHICAGO, ILLINOIS: Returning to Chicago for the 11th time since its inaugural there in 1919, the 41st edition of the American Society for Metals' National Exposition and Congress will be staged November 2-6, 1959.

Theme for both Exposition and Congress phases of the spectacular annual "Metal Show" is "Materials and Fabrication Preview of the Soaring '60's". The Exposition will be held in the International Amphitheatre. Nearly 400 exhibits will occupy 300,000 square feet of exhibit space. Congress sessions will be held in several Chicago hotels.

Attendance for the Show is estimated at 50,000.

EDITOR'S NOTE: Complete details on the Exposition and Congress, including a complete list of welding exhibitors at the Exposition, will appear in our November Metal Show issue.

COMING EVENTS

October 11-16: Pacific Area National Meeting, American Society for Testing, Sheraton-Palace, San Francisco.

October 19-20: West Central Zone Meeting N.W.S.A., Pick-Nicollet Hotel, Minneapolis.

October 22-23: Western Zone Meeting, N.W.S.A., Riviera Hotel, Las Vegas, Nevada.

November 30-December 1: Southeastern Zone Meeting, N.W.S.A., Atlanta Biltmore Hotel, Atlanta.

December 3-4: Southwestern Zone Meeting, N.W.S.A., Hotel Texas, Fort Worth.

April 25-29: 41st Annual Meeting and Welding Exposition, American Welding Society, Los Angeles.

NWSA Selects Zone Meeting Theme

PHILADELPHIA, PENNA.: "Progress-Success . . . N.W.S.A." has been selected as the theme for 1959-1960 Zone Meetings of the National Welding Supply Association. The first meeting of the year was held by the Central Zone in Detroit on September 24 and 25. It was followed by the Eastern Zone Meeting in New York City on September 28 and 29.

Zone meetings scheduled for the remainder of the season include:

West Central Zone: October 19 and 20, Pick-Nicollet Hotel, Minneapolis.

Western Zone: October 22 and 23, Riviera Hotel, Las Vegas, Nevada.

Southeastern Zone: November 30 and December 1, Atlanta, Georgia.

Southwestern Zone: December 3 and 4, Hotel Texas, Fort Worth.

NCG Moves Buffalo Offices And Warehouse

BUFFALO, NEW YORK: The Buffalo district office and warehouse of the National Cylinder Gas Division of Chemetron Corporation have been moved to 396 Grand Island Boulevard, Tonawanda, it was announced by J. S. Manley, district manager.

Narda Ultrasonics Announces Expansion

WESTBURY, L. I., N. Y.: The Narda Ultrasonic Corp. has moved into a second building here in the New Cassel area of Westbury. The new building is a 10,000 square foot, one-story structure at 50 Sylvester Street adjacent to the main Narda plant.

New Distributors And Sales Representatives

All-State Welding Alloys Co., Inc., White Plains, N. Y.: Ballach Company, Des Moines; Elyria Supplies Co., Elyria, Ohio; Lima Welding Supply Co., Lima, Ohio, and Magnolia Welding Supply Co., Pasogonla, Mississippi.

ARO Spot Welder Division of Guthery Machine Tool Corp., Long Island City, N. Y.: Essex Welding Equipment Co., Inc., Newark, New Jersey.

Federal Machine and Welder Co., Warren, Ohio: Harding Equipment Co., Paramus, New Jersey.

Harnischfeger Corporation, Milwaukee: Arizona Products & Machine Co., Phoenix, and A. E. Bogg Machine & Tool Co., Jefferson City, Missouri.

Tube Turns Division of Chemetron Corp., Louisville, Kentucky: Charleston Supply Co., Charleston, S. C.; John Day Rubber & Supply Co., Omaha; C. S. Mersick Company, New Haven; National Plumbing & Heating Supply Co., Providence; New Hampshire Supply Co., Manchester, and Raritan Supply Co., Nixon, N. J.

United Specialties, Inc., El Dorado, Arkansas: T. J. Maloney & Associates, Chicago; Floyd W. Davies, Cleveland; Edward M. Synan & Associates, Somerset, Mass.; J. W. Sableman, St. Louis; Walter Weyman Co., Inc., Berkeley, Calif.; J. B. Milligan Co., Pittsburgh; W. H. Bolton Co., Dallas, and Harold P. Ackerman Associates, Upper Darby, Pa.

Alloy Rods Sets Up Surfacing Division

YORK, PENNA.: Organization of a Hard Surfacing Division to be operated as a separate sales group has been announced by E. R. Walsh, III, vice president in charge of sales, Alloy Rods Company. Einar Iverson of the Company's Chicago office has been named manager and will make his headquarters at the firm's main offices in York.

Products to be included in the division's activities are Wear-Arc hard surfacing electrodes, Tool-Arc tool and die welding electrodes and Wear-O-Matic wires and wire feed units.

more news on next page

About RWAA

BY J. C. COX
president
Resistance Welding Alloy Association

Resistance Welding Alloy Association is an association of manufacturers of resistance welding alloys and electrodes formed to make further progress in resistance welding through collective effort and the exchange of ideas and developments.

What has been done is but a stepping stone to the development of greater economy in the growing use of the process.

With the greater use of automation in resistance welding, better materials are required to maintain uniform weld quality. Working together, R.W.A.A. members with their combined years of experience and the facilities at their disposal, should be able to keep up with these advances.

An educational program is planned to help the novice in resistance welding make progress in the art. Too little has been done to keep certain fundamentals before the users of resistance welding, to take proper care of the new specialized materials that are now available, which is necessary to obtain optimum results.

As mentioned in the R.W.A.A. booklet, the automated high production schedules of today —providing more things for more people—are a direct result of the constructive force of industry cooperation. The Resistance Welding Alloy Association is part of this constructive force, affording its members

continued on page 86

Southern Oxygen Markets Liquid Argon

WASHINGTON, D. C.: Southern Oxygen Company has announced their exclusive sales and distribution agreement with Spencer Chemical Co., Kansas City, Missouri. Under the agreement, Southern Oxygen will market the entire output of Spencer's liquid argon plant in Vicksburg, Mississippi. Large bulk argon liquid storage stations are being installed at strategic points around the entire eastern region from which deliveries can be made and cylinders refilled for distributors and consumers of argon. About 3½ million cubic feet of argon will be produced and sold monthly.

GE Moves Resistance Welding Controls

DETROIT, MICHIGAN: General Electric Co. is transferring its resistance welding control business to Detroit. The Company's Service Shops Department, through its Detroit operation at 5950 Third Avenue, will engineer, manufacture and market all General Electric controls for resistance welding applications and will handle renewal parts and repairs.

CLEVELAND, OHIO: James F. Lincoln, chairman of the board of Lincoln Electric Co., congratulates John F. Saenger, Jr., of Columbus, 1959-1960 recipient of Ohio State University's "A. F. Davis Memorial Scholarship" in welding engineering. Prof. Roy B. McCauley of Ohio State (left) and William Irrgang, president of the company, look on. Occasion for the ceremony was the disclosure by McCauley that Davis, secretary of Lincoln Electric until his death on May 25, was the anonymous donor of the scholarship in 1942.

more news on page 85

About NWSA

BY A. C. AXTELL
president
National Welding Supply Association

I want to use this column to acquaint the many users of welding equipment with the National Welding Supply Association and its purposes. The organization was started in 1945 by a number of distributors of welding equipment from Southern Ohio and West Virginia. Many of these men are still very active; in some cases the sons of the original founders are now active. Such dedication must be for a reason, reasons which are for the benefit of the purchasers of welding equipment, the manufacturers of this equipment and the distributor members of the Association.

Since the inception of the Association, many men have served long and hard to bring it to the position it has now reached. At present there are 406 active members (distributors) and 181 associated members (manufacturers).

The purposes and objectives of the N.W.S.A. are many. These are the most important:

1. Develop more friendly business relations, mutual confidence and good will among members, with their sources of supply and with their customers; promote fair trade policies throughout the industry.
2. Compile data to demonstrate that our products can be more economically distributed and better market coverage secured when the services and facilities of the welding supply distributor are used.
3. Encourage buyers to regard distributors as logical and dependable source of supply.

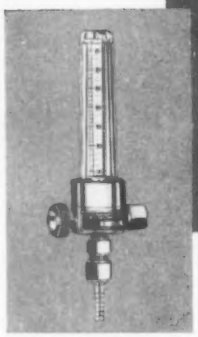
The Code of Ethics adopted

continued on page 86

VICTOR MODEL VTS200 SERIES TWO-STAGE REGULATOR

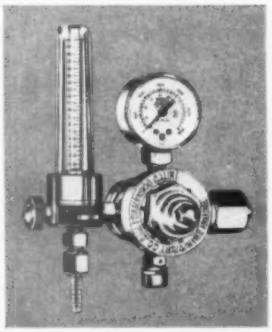
VICTOR REGULATORS & VICTROMETERS

give you precise control and measurement of gases



MODEL V SERIES INDUSTRIAL VICTROMETER

Victor regulators and flowmeters provide accurate, safe control and measurement of gases used in industrial applications, such as welding and cutting; gas shielded arc welding; laboratory work; atmosphere control; furnace operations, etc. For use with oxygen, air, argon, helium, nitrogen, hydrogen, carbon dioxide, and other gases.



VICTOR REGULATOR-VICTROMETER COMBINATION UNIT

- **FEATURES:** Construction—compact, sturdy design provides adequate capacity with minimum weight and size.
- **VICTOR SINGLE-STAGE REGULATORS** meet requirements of capacity and delivery pressure with minimum variation.
- **VICTOR TWO-STAGE REGULATORS** are recommended for operations requiring constant delivery pressure over a range of varying inlet pressures.
- **INDUSTRIAL VICTROMETERS** provide reliable, efficient measurement of gas flow. Gauge is visible from all sides. Tubes and floats can be easily changed or adjusted for different gases and flow rates.
- **REGULATOR-VICTROMETER COMBINATIONS**—Single or two-stage regulators may be combined with Victrometers making a compact unit that both regulates and measures gas flow.

Specify Victor for your job. See your Victor dealer or write us.

VICTOR for regulators and flowmeters

VICTOR EQUIPMENT COMPANY 59

Mfrs. of high pressure and large volume gas regulators; welding & cutting equipment; hardfacing rods; blasting nozzles; cobalt & tungsten castings; straight-line and shape cutting machines.

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N.W.S.A. INDEX 1010

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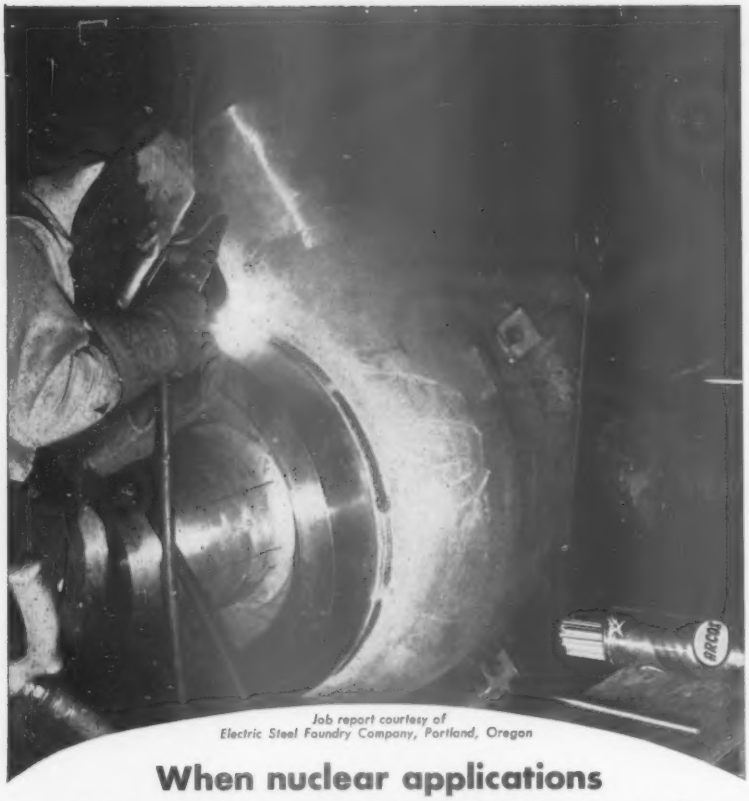


Job report courtesy of
Electric Steel Foundry Company, Portland, Oregon

When nuclear applications call for stainless welds of highest quality

WELD WITH ARCOS

STAINLESS ELECTRODES

This is part of a 3900 lb. stainless pump-volute casting for a submarine nuclear power plant. In the photo, a skirt is being welded to the casting using 5/32" dia. Arcos Chromend K Electrodes. To minimize stresses, a step-back and skip procedure was used. These welds conformed to Class I Navy radiographic standards—an indication of the dependability of standard Arcos electrodes for your stainless welding needs. ARCOS CORPORATION, 1500 South 50th St., Philadelphia 43, Pa.

For More Information Circle No. 10 on Reader Service Card.

MEN ON THE MOVE

Roediger

Duncan

Dato

Fox

PROMOTIONS:

Robert E. Roediger has been named manager of electrode sales for *Hobart Brothers Co.* He is succeeded as district representative in Tennessee, Alabama, Mississippi and Louisiana by **Wendell Jones,** formerly with *Welding Gas Products Co.*, Chattanooga.

C. Blaine Duncan has been named general sales manager of *Sight Feed Generator Co.*, West Alexandria, Ohio, according to an announcement by **Carl F. Smith,** president.

Linde Company, Division of Union Carbide Corp., has announced the appointment of **J. E. Dato** as sales manager, electric welding. He had been manager—electric welding, Eastern Region.

Announcement of the appointment of **Robert F. Fox** to the position of national sales manager has just been made by **R. D. Wasserman,** president of *Eutectic Welding Alloys Corp.*

Victor Equipment Company's Southwestern District Sales Division has been expanded both on an area and personnel basis. **E. O. Williams,** vice president and director, will have increased responsibilities including overall supervision, development of

new business and establishment of new branch outlets. He will be relieved of much detail work by **F. V. McGinley** who has been appointed Branch Manager in Los Angeles and Assistant Manager of the Southwestern District Sales Division.

Two executives have been named vice presidents at *Industrial Air Products Co*, Portland, Oregon. **M. A. (Mike) Gudman** is vice president-comptroller and **Kurt Kuhlmann** is in charge of all production.

Dorsey L. Lawrence has been named assistant district manager of the Milwaukee district of the *National Cylinder Gas Division of Chemetron Corp.*

Air Products, Inc., Trexlertown, Pa., has appointed **H. E. Everett** assistant general manager of the company's industrial and medical gas division.

Robert B. Schulters has been appointed director of engineering at the Aurora, Illinois, Works of *Thor Power Tool Co.*

Carpenter Steel Co. has promoted four members of its sales staff. **Earl W. Dunkle** has been made assistant manager, alloy steel sales; **Robert E. Frederick** is now assistant advertising manager; **Luther T. Miller** is promoted to manager of warehouse inventories; **Robert J. Buttery** is general traffic manager.

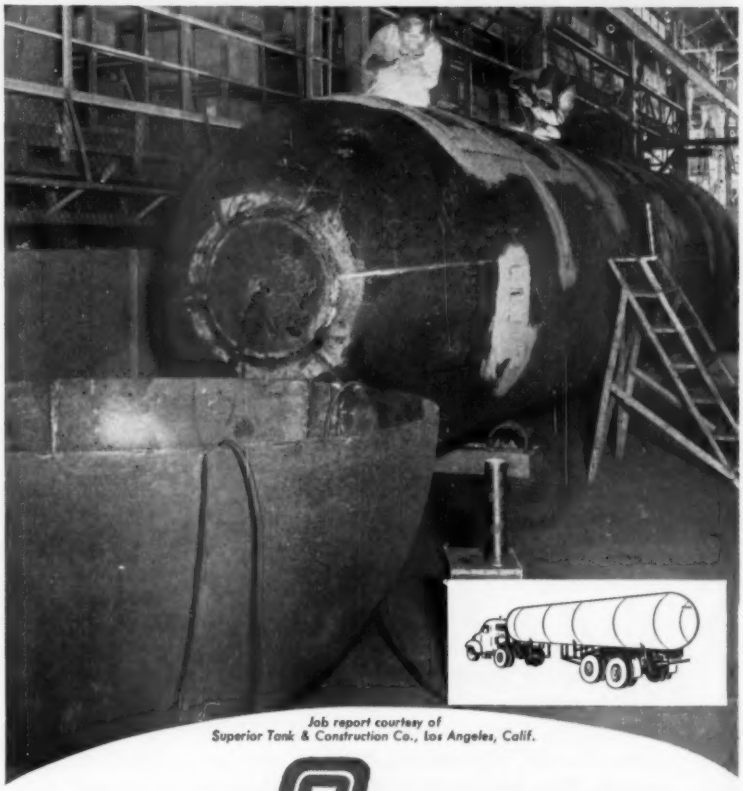
Albert G. Galler has been appointed an abrasive engineer by *Norton Company* in northern New Jersey.

Four district managers have been named for four new sales districts by *Sperry Products Inc.* They are **Tracy W. McFarlan,** Eastern District, New York; **Ralph H. Frank,** Central District, Pittsburgh; **James M. Dickey,** Midwest District, St. Louis, and **Carl B. Haugh,** Western District, Los Angeles.

Severance Tool Industries, Inc., Saginaw, Mich., has appointed **Robert H. Severance** district representative in Oklahoma, Arkansas, Texas and Louisiana.

continued on page 20

How X-Ray Quality Welds Make Low Alloy Steels Pay Off



Job report courtesy of Superior Tank & Construction Co., Los Angeles, Calif.

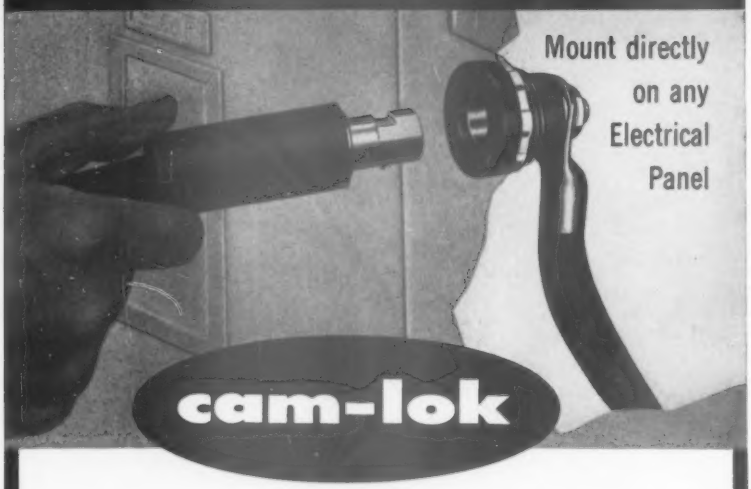
WELD WITH ARCOS

LOW HYDROGEN ELECTRODES

The vessel being welded is part of an L.P.G. tank truck. For high strength with low weight—USS "T-1" steel is used and welded with Arcos Ductilend 110 Electrodes. These tanks meet or exceed ASME code requirements . . . and all Ductilend 110 welds qualify with X-ray soundness. Ductilend 110 is an Arcos Low Hydrogen Electrode especially developed for welding high strength notch tough steels of the 110,000 psi tensile strength range. Data sheet on request. ARCOS CORPORATION • 1500 South 50th Street, Philadelphia 43, Pa.

For More Information Circle No. 11 on Reader Service Card.

New Hi-Impact Plastic Insulated
Panel Receptacles and Mating Plugs



Now, you can make fast, positive power connections to any metal panel or housing without special insulating materials. Simply punch out a hole and insert a Cam-Lok self-insulated Receptacle! Uses standard electrical lock-nuts, affords "dead-front" protection. Push in and twist Cam-Lok mating Plug and you've made a locked connection, which can be released quickly.

New Cam-Lok Receptacles eliminate costs of special insulating panels and reduce assembly time. Patented, high-pressure contact assures minimum resistance and heating.

Cam-Lok has a complete line of Receptacles and Plugs in many sizes and designs. Standard and special purpose Power Distribution Connections are available. Write today for new Bulletin No. 301.

"Dead Front" design for fast
direct mounting on . . .

• ELECTRICAL DISTRIBUTION PANELS • SWITCHGEAR
• BUS DUCT • JUNCTION BOXES
• WIREWAY or any electrical cubicle

A Complete Line of Welding Accessories and Special Power Distribution Connections

cam-lok DIVISION

EMPIRE PRODUCTS, INC.
P.O. BOX U-98
CINCINNATI 36, OHIO

For More Information Circle No. 19 on Reader Service Card.

MEN ON THE MOVE

continued from page 19

DEATHS:

Albert F. Wall, chairman of the board of *Wall Colmonoy Corp.*, died early in August at the age of 68. He was the founder and president of several manufacturing firms.

John H. Mulder, former secretary of *Miller Electric Mfg Co., Inc.*, Appleton, Wisconsin, and a member of the Board of Directors, passed away at his home early in August. He had retired from the firm in March.

The death of **Richard McCoy,** 40, welding sales engineer, is announced with regret by **Metal & Thermit Corp.** He died from injuries received in an automobile accident.

APPOINTMENTS:

Richard L. Haligas has been appointed Midwestern District Manager for the *Carol Cable Co.*, Pawtucket, R. I.

Fred Jaeger has been named manager of the newly formed Safety Department of *Essex Welding Equipment Co.*, Newark. He had been with *Mine Safety Appliances.*

Donn Fraser has been appointed field representative in Canada by the *Arcair Company, Eastern Division*, Lancaster, Ohio. He will cover all provinces in Canada except for British Columbia

George M. Hargreaves has been named market and research director for *Detroit Stamping Co.* He will be in charge of marketing, advertising, sales promotion and product development.

Jack Thesenge has been named factory sales representative for *Sellstrom Mfg. Co.*, Palatine, Ill. He will cover Colorado, Kansas, Nebraska, Wyoming, Montana, North and South Dakota and Neighboring Canadian provinces.

New assignments have been within the field sales force of *Olin Alumi-*

mum. **James H. Wright** has been named district sales manager in Cincinnati. **Robert W. Laming** has been appointed district sales manager in Cleveland and is succeeded by **Arnold H. Justice.**

The *Canadian Welding Bureau* has announced the appointment of **Joseph T. Biskup** as chief welding engineer with headquarters in Toronto. Mr. Biskup's duty will be to help fabricators meet the conditions laid down in the various welding codes of the *Canadian Standards Associations.*

Bren Weld Corporation (formerly Brennen, Bucci & Weber, Inc.) has announced the appointment of **Joseph F. Sharpe** as sales manager.

The following new welder sales appointee will be under the supervision of **Carl L. Mickovich,** assistant to **E. L. O'Neill,** vice president and general sales manager of the *Emerson Electric Mfg. Co.,* St. Louis: **Richard C. Mundwiller** (North and South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Michigan and Missouri); **Sam N. Garber,** (California, Oregon, Washington, Montana, Idaho, Wyoming, Utah, Nevada, Arizona and New Mexico), and **Harold F. Flynn** (Pennsylvania, Maryland, Delaware, New Jersey, New York, Connecticut and Massachusetts).

Arthur Berlin, Colonia, New Jersey, has been named Eastern Division Sales Manager for *Sight Feed Generator Co.,* West Alexandria, Ohio, according to **C. Blaine Duncan,** general sales manager. Mr. Berlin, who has had 20 years experience in engineering and sales, has discontinued *Automation Industries, Inc.,* and will devote his full time to the sales and service of Sight Feed and Rexarc products in the East. A company Division Office has been estabilshed at 790 Broad St., Newark, N. J.

Immediate plans call for a definite sales expansion program in the Eastern area. Mr. Berlin will develop and supervise an enlarged sales organization in the area in conjunction with the company's home office.

WELDERAMA YEAR AT MARQUETTE

The Answers to Your Gas Welding Equipment Needs in 32-Pages

This new 32-page MARQUETTE Catalog will be your handiest reference file on all oxy-acetylene welding and cutting equipment and supplies.

Fully illustrated, it provides complete information, features and sizes on the following products: The complete line of MARQUETTE torches and range of welding and cutting tips available for each. These torches cover all ranges of welding applications, including heavy, medium and light duty, soldering and continuous heavy duty cutting.

Also fully covered are: MARQUETTE gas pressure regulators; welding hose and hose connections; low temperature torches and tips; heating torches and oxy-acetylene gas welding accessories, regulator adaptors, manifolds, valves and wrenches.

Supply items covered include: goggles, face shields, gloves, cylinder trucks, soldering and brazing supplies and welding rods for all standard and special welding applications. Call your jobber for a copy of this complete gas welding reference. Or write us today.

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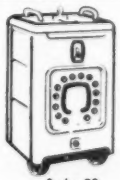
MANUFACTURING CO., INC.
307 E. HENNEPIN AVENUE, MINNEAPOLIS 14, MINNESOTA


Series 90
NOISELESS A. C. WELDER

ARC AND GAS
WELDING ELECTRODES

"Jet" Series
OXY-ACETYLENE
WELDING & CUTTING EQUIPMENT

For More Information Circle No. 54 on Reader Service Card.

NEW!

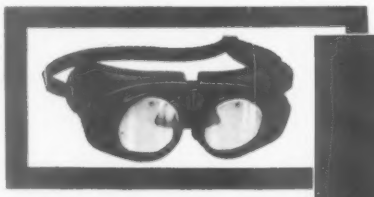
AO COVERGLAS GOGGLE FITS 99% OF WELDERS

Meet the new AO 329A Welders' Coverglas Goggle — with a wide range of vision and fitting ease.

Designed to exceed government specifications, the 329A: (1) Fits over all types of correction spectacles, including those with decentered temple pieces. (2) lenses measure 50 mm. round.

In addition to offering superb fitting qualities proven by tests, the 329A simplifies lens stocks since it accommodates 50 mm. rd. lenses used as standard in all other type goggles regularly used. (Users prefer a large cover goggle with 50 mm. rd. lenses.) Also, the goggle has increased ventilation and a more attractive appearance.

The 329A protects against injurious light radiation, glare and flying sparks. A companion chippers' model (325A) is identical except for its direct ventilation and clear lenses. Your nearest AO Safety Products Representative can supply you.



QUICK FACTS

- Solid fiber lens retaining rings prevent light leaks.
- Indirectly ventilated side louvers.
- Filterweld No. 5 shade lenses standard.
- Adjustable leather bridge. Also available with rigid bar bridge as 329B and with adjustable rigid bridge as 329R.
- Frames are cellulose acetate, opaque brown.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

Always Insist on AO Trademarked Safety Products

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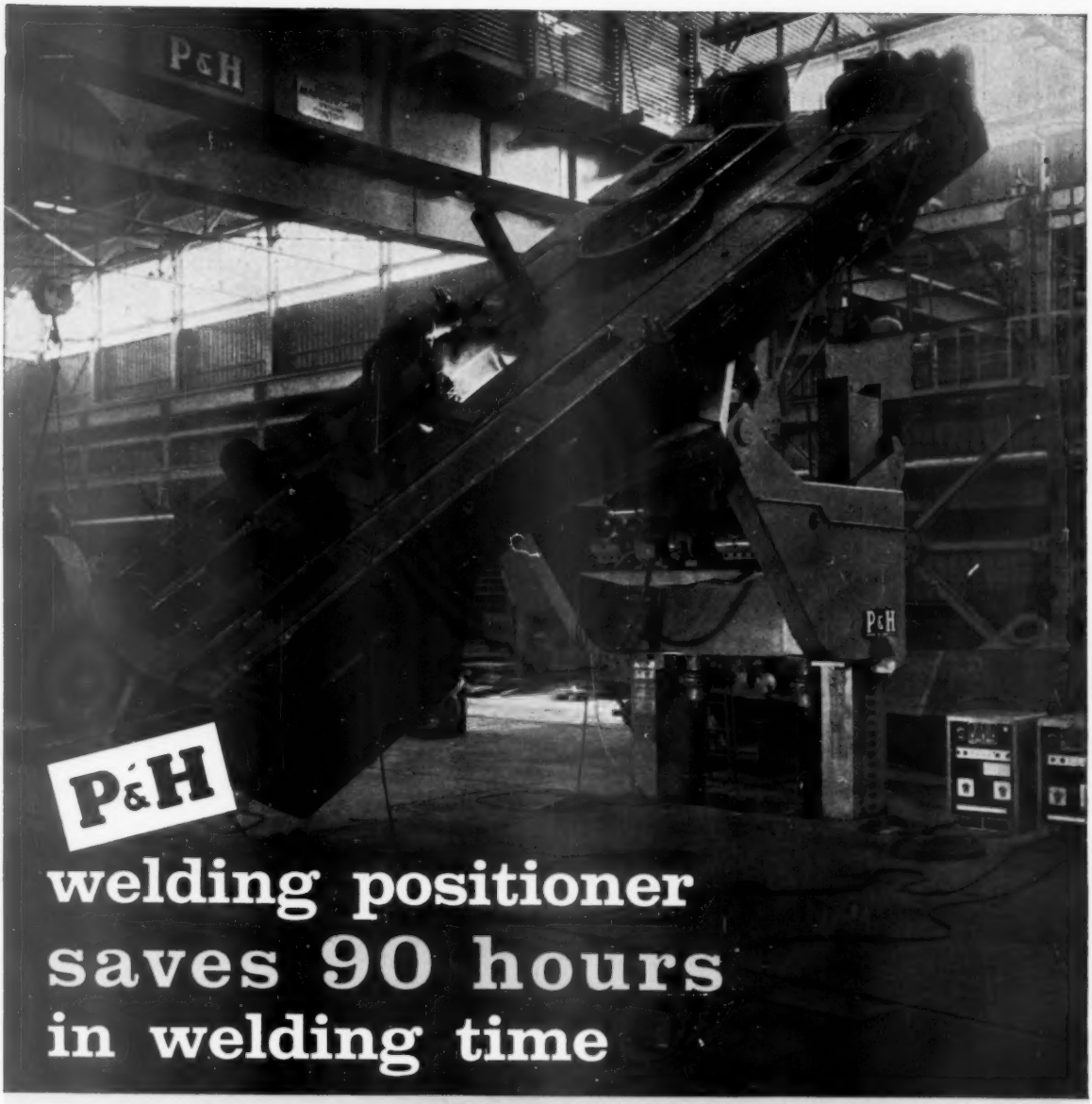


P&H welding positioner saves 90 hours in welding time

The P&H WP-80 — world's largest power-elevating positioner — is the only welding positioner made that can power-elevate 40-ton weldments.

Savings come big when you use P&H welding positioners in your welding operations. Here's proof — the results obtained by using a P&H WP-80 positioner in welding the power-shovel frame shown above:

The weldment is 12 ft. wide, 35 ft. long, 3½ ft. high, and weighs 59,000 lbs.

Downhand welding permitted depositing much heavier first-run beads, thus eliminating stringer beads. The number of passes in most cases dropped from three to one. The result: *a cut of 90 hours in welding time alone!* And the number of crane lifts was slashed from 32 to 9.

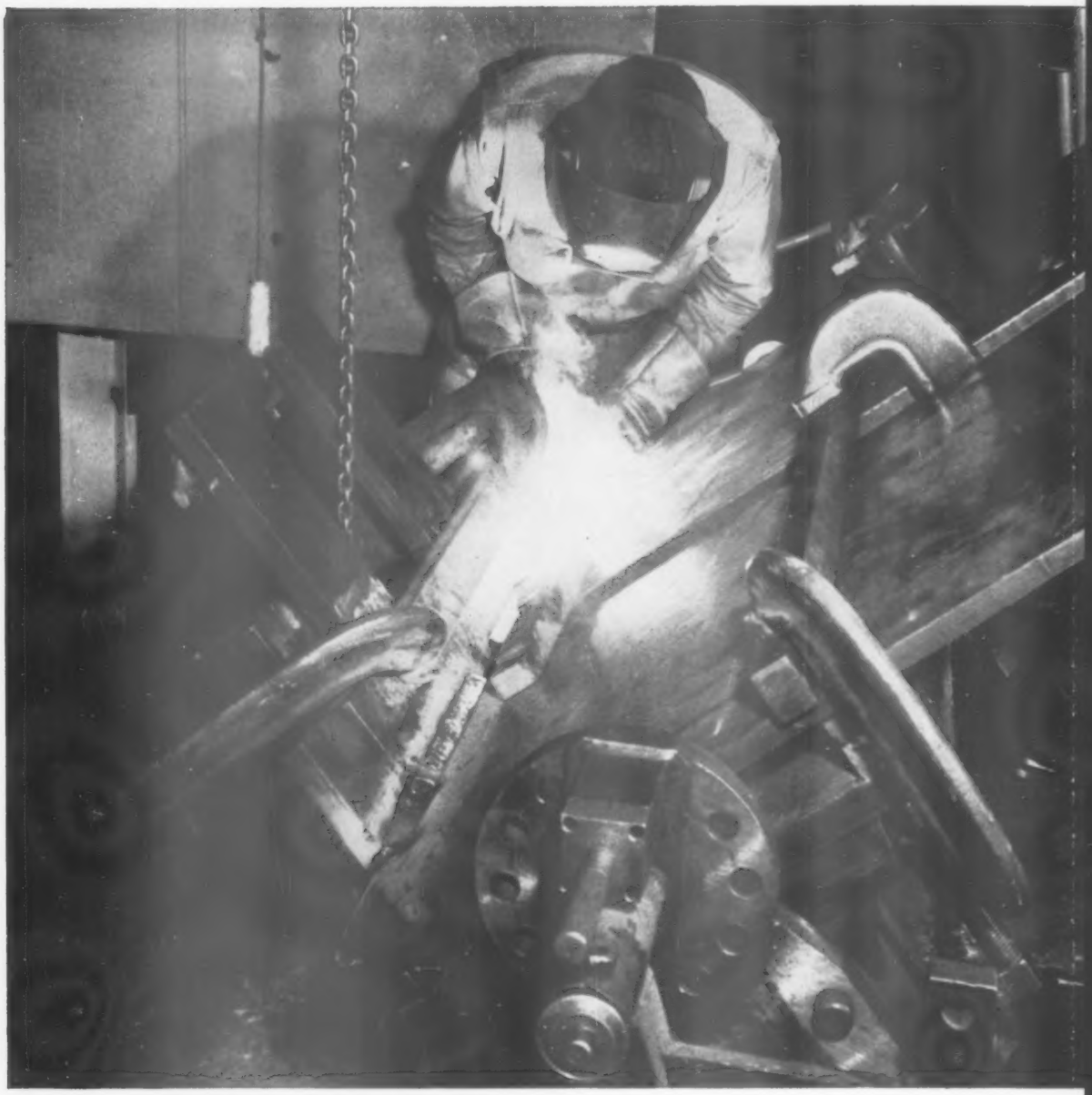
With the WP-80, work interruptions dropped sharply — safety was greatly improved. That's because, once the piece is secured on the positioner, the operator can position it at any angle quickly and easily by remote control.

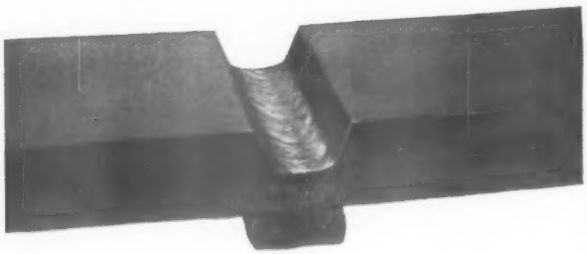
P&H offers you a complete line of welding positioners in capacities from 500 to 100,000 lbs. — with variable speed, if you desire. For more facts, get a copy of "What you should know about welding positioners." Write to Dept. 309B, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER

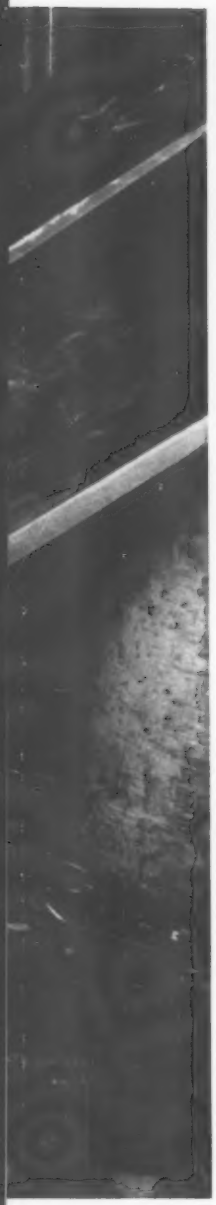
P&H WELDERS • ELECTRODES • POSITIONERS

For More Information Circle No. 39 on Reader Service Card.





Smooth bead and good wash-in, give Jetweld 2 easy slag removal.



Did you ever think that you would find

an E6027 for the same price as an E6020?

Jetweld 2 *is* that rod!

Designed specially for
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Jetweld 2 has qualities
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It makes such smooth beads
that there is no need
to grind off cover passes,
even for taking X-rays.

It restrikes cold.

The exceptional wash-in
and easy slag removal
cut cleaning time to virtually nothing.

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quality is unsurpassed, reducing
welding costs to rock bottom.

And it sells at
the same price as E6020 rods.

No wonder, more and more
profit-conscious companies
are switching to Jetweld 2.

It is the best E6027 on the market!

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The world's leading manufacturer of arc welders, electrodes, ac motors and battery chargers

P. S. Don't forget Jetweld 2's
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Jetweld 2-HT.

All the same advantages, plus
70-80,000 tensile strength
and 25-30% elongation . . .
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AND BOTH MILLERS ... *Through and Through*

BIG TWIN combination ac-dc welders work from single phase service — deliver new convenience and economy. Two a-c amperage ranges of 20-125 and 60-290 plus two d-c ranges of 18-100 and 65-290 amps master nearly every welding requirement from light gauge metal to structural pieces. Movable shunt type transformer affords infinite current adjustments. Other features include: Horizontal design for easy stacking; weather-resistant construction and Class B insulation; Miller-built semi-metallic rectifier for best d-c welding; high open circuit voltages and new weld stabilizer. This is THE all-time, all-around welder!

LITTLE TWIN ac-dc combination welder has two a-c amperage ranges of 20-115 and 60-180 plus one d-c range of 40-150. Operating from single phase service, this Miller model incorporates many design and construction features usually found only in large industrial types. These include really rugged construction, forced air cooling, new Miller semi-metallic rectifier, movable shunt type current control, new weld stabilizer and open circuit voltage in abundance. Power factor correction is available on both models. Complete specifications on either model will be sent promptly upon request.

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Spot Welds from One Side

Model G

ARC SPOT WELD GUN

Automatic Time Control

SHEET METAL • DUCT WORK
TANKS • CABINETS • ROOFING
PLUMBING • SIGNS • AUTO BODY WORK
NO EXPERIENCE REQUIRED

OUTSTANDING FEATURES

- Many times faster than any other fastening method
- No distortion of metal
- Simple and safe to operate
- All metal construction; no plastics
- Welds from one side without back-up electrode
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- No electronic tubes in time control
- Requires no warmup period
- No welding experience needed
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- Recommended for use with BREN/WELD Power Supply or BREN/WELD Arc Welder
- Weighs less than 2 lbs.

Model G. Gun supplied with 15 ft. cable, 2 nose guides and 1 lb. BREN/WELD #16 electrodes, ready to operate. Just connect to our arc welder or power supply.

$49.50

INDISPENSABLE FOR sheet metal work of all kinds . . . now, for the first time, spot welds can be made with a light weight, automatically-timed spot weld gun. Absolutely no experience required. The gun does all the work. Just press against the spot to be welded. No triggers or levers to operate at a certain moment. Just press and weld. Welding current shuts off automatically after predetermined time set on control dial. Every weld uniformly perfect.

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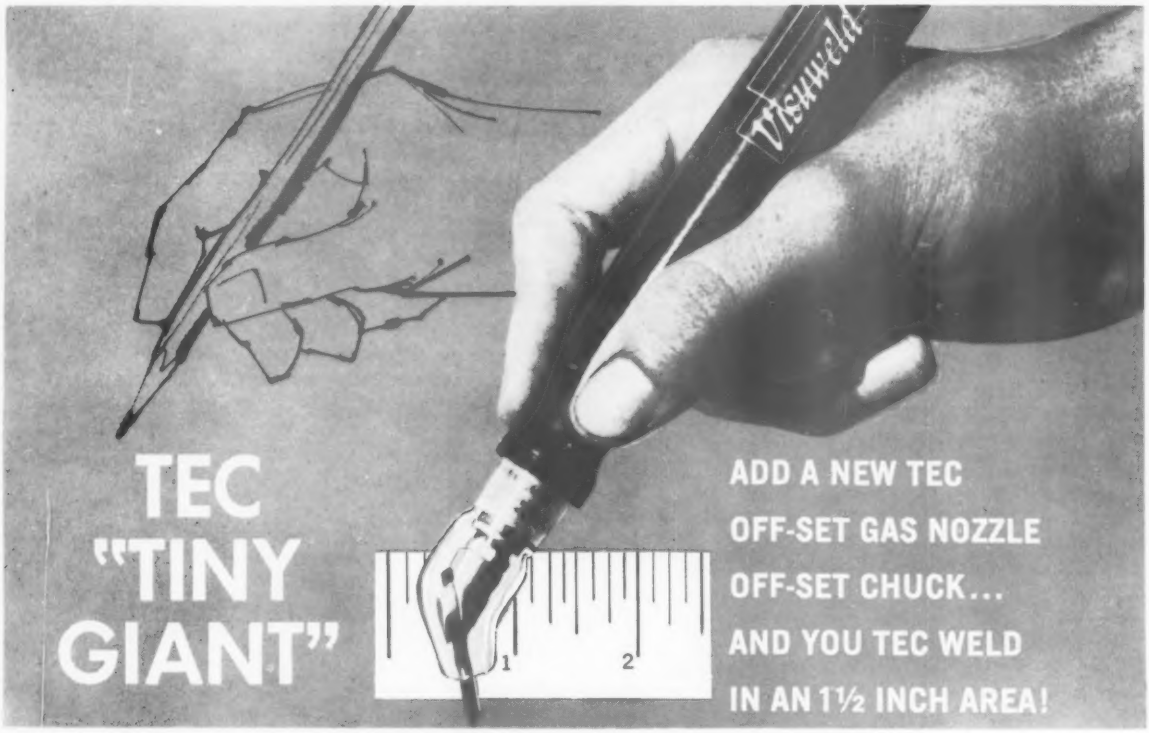
Speaking of *"Pencils"*...Look what's happened to the TEC Pencil Torch!...



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NOW WELD IN NORMALLY INACCESSIBLE AREAS WITH THOSE FAMOUS TEC FEATURES:

"TIP-OF-THE-TORCH" COOLING SO YOU WELD CONTINUOUSLY AT 300 AMPS!
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GUARANTEED GAS AND WATER LEAKPROOF!
One-piece unit torch head without threaded fittings or gaskets to wear or leak eliminates gas and water leakage.

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Off-set Nozzle
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A durable, Vycor nozzle, transparent so you SEE WHAT YOU WELD coupled with an easy adjusting "non-slip" chuck.

SPECIFICATIONS

OVERALL LENGTH— 8¼ in. with 45° Nozzle 8 in. with 90° Nozzle	WORK RANGE— 3 to 300 Amps Continuous Cycle
WORKING WEIGHT— 3 ounces	HANDLE DIAMETER— 1 inch
HOSE LENGTH— 12½ feet	EXTRA LENGTH AVAILABLE 25 feet

NOZZLE SUPPLIED — 45° or 90°, Vycor,® 3 in. orfice extension available

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OCTOBER, 1959

Welding Design & Fabrication

ESTABLISHED IN 1930 AS INDUSTRY & WELDING

PART 2 of two

The Strength Of Arc Welded Joints

IN BRIEF: Here is the answer to a question that has troubled designers for many years: Are there any conditions under which residual stresses can exert an adverse influence upon a steel structure's safe load carrying capacity?

THE LOCALIZED HEAT of welding produces residual stresses.

For many years the question has been whether there are any conditions under which such stresses can exert an adverse influence on a steel structure's load carrying capacity.

Residual stresses, which remain permanently or semi-permanently in a steel member or assembly, should not be confused with temporary shrinkage stresses and their effects. Cracking can be caused by these temporary shrinkage stresses while parts of a weldment are cooling at different rates. Under unfavorable conditions, the restraint against shrinkage may impose temporary internal stresses upon a part at a time when its temperature or rate of cooling make it more susceptible to cracking than it would have been after cooling. Therefore, it is sometimes necessary to take special care to prevent shrinkage cracks. For example, preheating or postheating may be used to retard the cooling rate of a welded joint. This usually results in some improvement of the mechanical properties of the as-welded material.

In work, such as fabrication of welded pressure vessels, it has been customary to provide a so-called "stress relief" heat treatment of 1100° to 1250° in a furnace after welding is completed. Experience shows the service behavior of such weldments has been improved by these heat treatments. It has also been demonstrated that such heat treatments reduced residual stresses considerably. It has also been shown that the ductility and toughness of the weld and the heat-affected zone are improved. The question is whether the better service behavior is partly the result of the decrease in residual stresses. Or is it entirely the result of the improvement of the properties of the material?

A large majority of the steel structures and weldments built throughout the world have not been given such stress-relief treatments. Some weldments, such as heavy frames for presses and military equipment, were customarily stress-relieved at one time. Now they are not. Many large, non-stress-relieved weldments, including heavy earthmoving equipment, have been subjected to very severe service conditions. In general, their behavior has been excellent. The reason? The ductility and notch-toughness of the steel material have been adequate for service conditions.

Much research has been devoted to determining if residual stresses can be detrimental under practical engineering conditions. The problem is very complex; no conclusive evidence has been developed to solve it. In the laboratory, as in practical work, any treatment that improves behavior involves other beneficial factors in addition to the reduction of residual stresses.

To demonstrate what has appeared to be an unfavorable effect of residual stress, investigators always have had to resort to procedures that involve other effects known to be very detrimental For example, they have introduced sharp machined notches and saw cuts which cause very high local concentrations of the stress imposed by loading the specimen. Such stress-raisers, and the triaxiality of stress that usually accompany them, cause most steel materials to behave in a brittle manner.

Others have driven wedges into sharp notches. Or, they have exhausted ductility in the localized region where fracture was to be initiated by some other means. They sometimes use a deposit of brittle hard facing material with a sharp notch cut in it. It is dif-

continued on page 30

ficult to determine the effect of residual stresses upon fracture initiation, when it is triggered by such drastic measures.

Tests have shown that residual stresses are mechanically relieved by external loading, deflections of beams and columns may be increased substantially in some cases as a result. Also, the stress-strain relationships are altered locally by the earlier onset of plastic deformations.

When a design method such as "plastic analysis" is used, based upon ultimate strength (with a suitable safety factor), such increased deflections or deformations may be of practical significance in some kinds of compression members of elements. It may be advisable to make some kinds of allowance for the effects of residual stresses upon stability or resistance to buckling.

Both experience and research have shown that the fatigue resistance of relatively small, carefully finished machined parts can be increased substantially by shot peening or surface rolling. This introduced residual compression stresses in such a manner as would be expected to produce a more favorable stress cycle. However, these methods involve consolidation of material by cold working. This might introduce an independent beneficial effect apart from that of the residual compression stress.

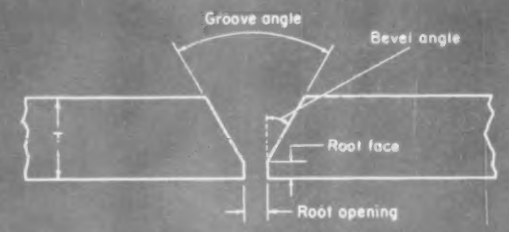
There seems to be no conclusive evidence from which to establish the detrimental effect of residual stresses upon the strength of structural parts or members that are subjected to tension or bending. Even in the fatigue testing of structural parts, in which comparatively low tension or bending stresses are repeated many times to cause failure, it has been shown that residual stresses are largely relieved during the first few cycles of loading; no important detrimental effect has been found.

Under practical conditions of control over steel fabrication and construction, it is virtually impossible to predict the magnitude and direction of residual stresses. A designer would have no rational basis upon which to determine them if he wished to include their effect in his calculations in some way.

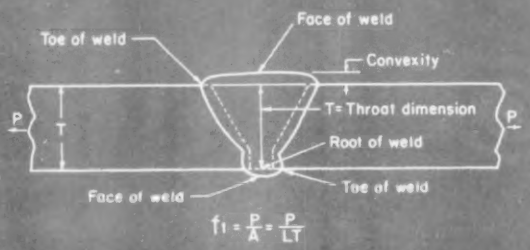
It has been recognized for many years that other kinds of secondary stresses occur in any steel engineering structure. When these are of a self-limiting nature, they do not cause serious overstress that would result in fracture. The reason? Even a very small degree of ductile behavior and very small plastic deformations in the steel material relieve or iron out such stresses. Therefore, they are no longer additive to load stresses.

In view of the splendid service records of non-stress-relieved welded structures in general, no attempt has been made to allow for an effect of residual stresses in designing practical welded structures. It has been standard practice to assume that such internally balanced residual stresses exert no important adverse influence. • •

EDITOR'S NOTE: This article is based on material included in the booklet "Arc Welded Joints" prepared by LaMotte Grover and published by the Arc Welding Section of the National Electrical Manufacturers Association.



Edge preparation for a single-vee groove weld



Single-vee groove weld

FIGURE 1: Butt joint made with single-Vee groove weld

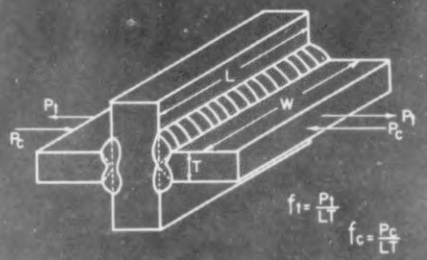
FIGURE 1: This butt weld joins two structural steel plates 10-inches wide and one-inch thick. The actual throat dimension of the weld in 1⅛-inch, including surface convexity. The maximum permissible unit tension stress for the base metal (structural steel material) is 20,000 psi. The maximum permissible stress for the butt weld is the same as for the base metal. Compute the maximum allowable tension load (P of Figure 1) that may be carried by the welded plates.

Answer: The nominal throat of the butt weld is considered equal to the thickness of the base metal adjacent to the weld. Therefore, the computed stress is the same for both weld metal and base metal. The allowable stress is also the same for both.

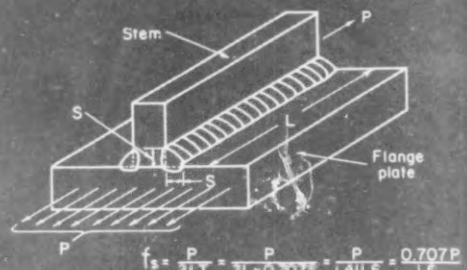
$$P = f_t A = 20{,}000 \times 10 \times 1 = 200{,}000 \text{ lb.}$$

When parts of different thicknesses are joined, the nominal throat dimension of a groove weld is always taken as the thickness of the thinner part. The small convexity of the butt weld is always neglected in computing allowable loads for the joint. Excessive convexity of a butt welds adds no strength. In fact, it will cause stress concentrations at the toes of the weld. These may be objectionable.

FIGURE 2A: The plates to which the compression load



(A) Groove-welds of tee-joints stressed in tension or compression



(B) Fillet welds of tee-joint stressed in shear

FIGURE 2A and 2B: Stress computations for Tee-joints.

These sample problems show how to determine the strength of an arc welded joint...

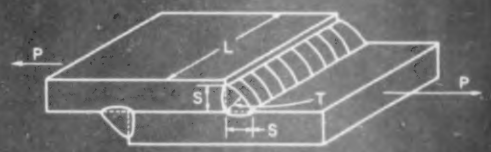


FIGURE 3: Double fillet welded lap joint.

P_c is applied are 6-inch wide alloy steel plates ½-inch thick. They are joined by complete penetration groove welds to the interposed vertical steel bar which is one-inch thick by 2½-inches wide and 6 inches long. The bar is the same kind of steel. The allowable stress for the base metal is 24,000 psi. That for the groove weld is also 24,000 psi. Compute the allowable steady load P_c, assuming that the lengths of the 6- by ½-inch plate are short enough, in the direction of loading, to prevent failure by buckling.

Answer: The interposed plate is considerably wider than the thickness of the connected plates (and of more than adequate thickness from the viewpoint of practicability of welding). So, the critical section obviously lies in the 6- by ½-inch plates. Therefore:

$$P_c = f_c LT = 24{,}000 \times 6 \times \tfrac{1}{2} = 72{,}000 \text{ lb.}$$

(If the load P were a fluctuating force, and especially in the case of its being a tension force, that fluctuated over a considerable range, the resistance of the assembly to such fatigue loading would be reduced by the stress concentrations at the toes of the welds.)

FIGURE 2B: The shearing force (P) is 72,000 lb. The length (L) is 10-inches. The plates are thick enough to cause failure in the welds rather than in the plate. The allowable shearing stress on the nominal throat section of a fillet weld 13,600 psi. Find the required size (S) of the fillet welds, assuming they are made only in sizes that increase by 1/16-inch increment in this range of sizes, that is, ¼-, 5/16-, ⅜- and 7/16-inches, etc.

Answer: $f_s = \dfrac{0.707P}{LS}$

$$S = \frac{0.707 \times 72{,}000}{10 \times 13{,}600} = 0.374\text{-inch}$$

Since 0.374 is greater than 5/16-inch but less than ⅜-inch, the required size is ⅜-inch.

FIGURE 3: The force (P) is 72,000 lb. The length of the double fillet welded lap joint is 10-inches. The plates are thick enough to cause failure in the welds rather than in the plate material. The allowable shearing stress on the nominal throat section of a fillet weld is 13,600 psi. The critical stress in the fillet welds is assumed to be shear on their throat areas. Find the required size of the fillet welds.

Answer: The answer and computation are exactly the same as for Figure 2B.

WELDED DESIGN of this 900-foot long New York State Thruway bridge at Suffern, N. Y., required 50 percent less steel than a riveted structure.

Engineers Have More Flexibility When Designing Welded Bridges

IN BRIEF: Welded bridges are increasing in number as designers turn to this type of construction to cut costs and improve architectural appearance.

IN DESIGNING a welded bridge structure, engineers have considerably more latitude in the selection of structural shapes and in the make-up of members. Sections of almost unlimited size or intricate shape, efficiently proportioned according to stress requirements, can be economically produced. Also, welding processes and techniques have been perfected to eliminate much of the human element and to give good welds.

DESIGN STANDARDS

Standards for the design of welded highway bridges are set forth in the "Standard Specifications for Welded Highway and Railway Bridges", 1956 Edition, of the American Welding Society and the "Standard Specifications for Highway Bridges" adopted by the American Association of State Highway Officials.

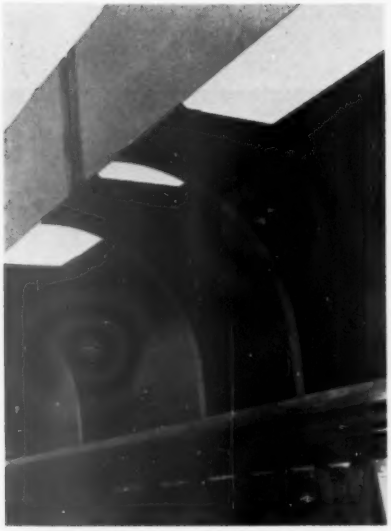
EDITOR'S NOTE: This aticle is based on material furnished by the American Institute of Steel Construction, Inc., a national organization representing the structural steel fabricating industry.

NEW YORK STATE PIONEERS

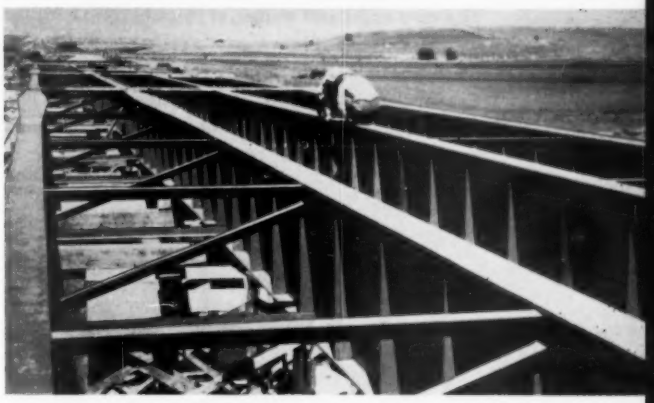
The Department of Public Works of the State of New York, Albany, New York, has been one of the pioneers in this country in welded bridge construction. Since 1942, the Department has designed and constructed approximately 300 steel bridges. Practically all of these bridges, and those required for the New York State Thruway, are of welded design.

The bridges are predominantly of deck-type incorporating composite construction. The combination of welded fabrication and composite design results in a bridge of pleasing architectural appearance and substantial savings in cost. Welded fabrication permits an efficient and economical use of material since no reduction in effective area is necessary to allow for holes in connections as in riveted structures. The Department estimated that the use of welded design effected savings in cost 15 to 20 percent over similiar riveted structures.

ALL-WELDED RAILROAD bridge at Cherry Valley, N. Y., cost 15 percent less than a riveted structure because it required 15 percent less steel.



WELDED DETAIL of New York State Thruway bridge over Cattaraugus Creek near Buffalo.



TYPICAL WELDED DESIGN on continuous bridge for Kansas Turnpike uses a girder of uniform depth with a tapering flange.

TWO-IN-ONE BRIDGE

One of the many welded bridges of particular interest on the New York Thruway is the 900-foot long bridge spanning the tracks of the Erie Railroad at Suffern, N. Y. The structure contains six main spans having lengths of 92-, 99-, 124- and 234-feet. There are three spans of 124-feet. In effect, there are two separate bridges alongside each other with each bridge having one 49-foot-wide roadway and two catwalks 3-feet 8-inches in width. Seven lines of girders support each of the two bridges or expressway lanes requiring a total of 84 girders for the six spans. The heaviest single girder is 175-feet long and weighs 55-tons.

The cantilever girders supporting the suspended span over the railroad tracks have a depth of 11-feet over the piers and taper to 4-feet 8-inches in width. Seven lines of girders support each of the two bridges or expressway lanes requiring a total of 84 girders for the six spans. The heaviest single girder is 175-feet long and weighs 55-tons.

The cantilever girders supporting the suspended span over the railroad tracks have a depth of 11-feet over the piers and taper to 4-feet 8-inches at the ends.

The girder webs, varying from 3/16-to-3/8-inches, were shipped from the mills in maximum lengths of 84 feet and were butt welded to obtain the required full-girder length. The webs were braced by stiffeners which were tacked into place and then fully welded before the flange plates were attached. On the face of the outside, or fascia, girders, vertical stiffeners were eliminated in favor of curved longitudinal stiffeners which followed the curve of the lower flange. The change to these more graceful lines were made solely in the interest of appearance.

Flange plates had a uniform width of 24-inches and varied in thickness according to their location on the girder, reaching a thickness of 3¼-inches at some points. They were spliced by double-V butt welds to obtain the required girder length since they were also received from the mills in maximum 84-foot lengths.

FLEXIBILITY OF WELDED DESIGN

Welded design provided the flexibility required to shape the bridge to meet the site conditions. The Thruway at this location is on both a vertical grade and a horizontal curve requiring superelevation. It is estimated that the welded design represented a savings of 50 percent in the weight of the steel in comparison with a riveted girder of constant section.

One of the largest all-welded steel highway bridges in the east is the New York State Thruway bridge across Cattaraugus Creek near Buffalo. The deck includes two 49-foot roadways, an 8-foot raised mall and two cantilever sidewalks requiring an overall width of 112 feet. It is supported by 12 lines of parallel girders on five spans of 132-feet each.

Girders are fabricated from web plates 66-inches deep and 7/16-inches thick and flange plates varying in thickness from 1 to 3½-inches on the bottom and from 1- to 2½-inches on the top. Web stiffeners are plates 11-inches wide and 11/16-inches thick except at the ends where one-inch thick plates are fitted flush.

Continued on page 72

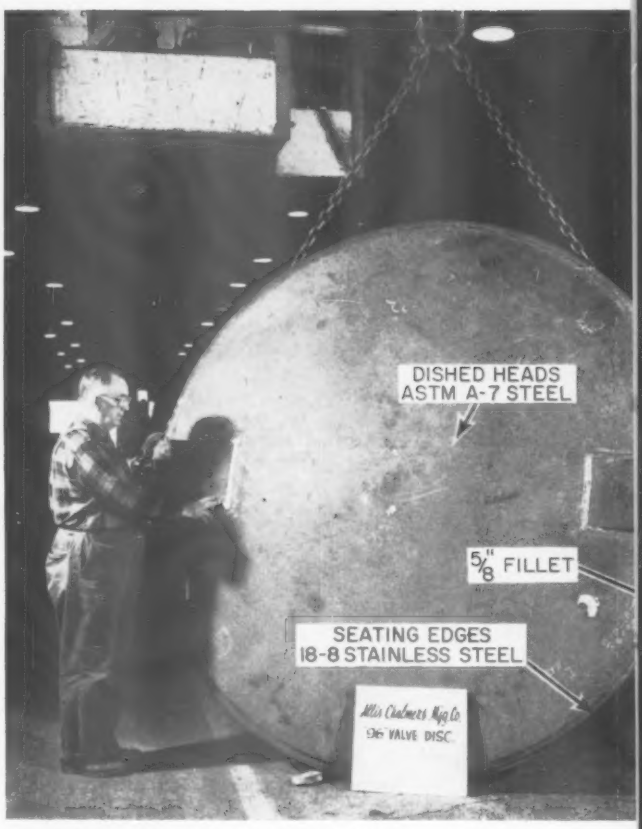
DESIGN CONSIDERATIONS

The American Water Works Association specifies that valve discs must have their seating edges covered to full width with 18-8 stainless steel, Monel, or bronze. The corrosion-free edges stay smooth, preserve the rubber seat, and prevent leaks. Automatic welding is a practical and effective way to combine stainless steel seating edges with strong, economical carbon steel plate.

The discs are designed to withstand a force of approximately 181,000 lb. when closed, at a maximum operating force differential of 25 psi. Maximum torque, transmitted from disc to shaft, is approximately 84,000 ft. lb.

The disc radii and material thicknesses that will resist these forces are spelled out in AWWA specifications. The material thickness at the shaft must fall within 1¾ to 2¼ times the valve shaft diameter; and this, with the diameter of the valve, determines the dished head radius. Stress analysis plays an important part in disc design. It's based on pressure and torque requirements with the working stress limited to 1/5 of the material's tensile strength.

An operational bonus resulting from the fabricated design is lower friction, thus, less pressure drop, across the smooth surfaces of the disc. Externally-ribbed discs lose considerably more pressure.



BIG VALVE DISC will hold 181,000-lb. force without leaking.

Stainless Combined With A-7 Steel

IN BRIEF: The heart of a big butterfly valve is its disc. Its designers eliminated seating corrosion with stainless steel; they used steel heads to hold a 181,000 lb. force; and welded them automatically to keep costs down.

RISING COSTS on one side and stepped-up competition on the other is forcing designers to specify automatic welding instead of manual wherever they can.

To illustrate, we're making eight rubber-seated butterfly valves at Allis-Chalmers—some of them 96 inches across—for a western dam. With our automatics we can move around the long seams 2½ times faster than we can with hand welding. The welds are more uniform; they're stronger and look better. They help us satisfy the stiff design requirements the valves have to meet.

FABRICATION AND WELDING

We start the disc with two dished heads, trim them to size, then cut slots for the hubs which carry the shafts. The heads are made of ASTM A-7 steel (rolled structural quality with a nominal tensile strength of 66,000 psi), 7/8-inches thick. To make the seating edges, we edge roll two semicircles from 18-8 stainless steel bar stock. We insert these between the dished heads and deposit husky tacks to hold the assembly together. The hubs are fitted into their slots and hand welded all around.

Next is automatic welding. The assembly is put on a positioner and tilted for valley welding. We make a continuous 5/8-inch fillet between head and seat with submerged arc. It takes three passes and strict attention to welding details (see table).

An important one is flux preparation. We heat it to 100°F to avoid welding defects caused by moisture.

First we weld one side of the disc, then the other. Between passes our inspectors make sure that the welds

JOINT DESIGN of steel valve body and careful welding sequence limits distortion.

ECONOMICAL automatic welding.

Solves 8-Ft. Valve Design Problem

by **HAROLD B. NUNNELEE,**
Allis-Chalmers Mfg. Co.

are free from defects.

To insure leak-free, high quality welds we give the completed valve disc a hydrostatic test. Test pressure is 50 psi, or double the maximum working pressure. During the test, one hub opening is sealed with bolted plates; the other's seal contains a fitting for introducing water and a gauge for indicating pressure.

The valve body also lends itself to fabrication by automatic submerged arc welding. It consists of two flanges, a cylinder, and two hubs.

The flanges on the large valve bodies are flame cut in segments from 3½-inch thick plate, then welded into a ring. The cylinder joining the two flanges is made from 2½-inch thick plate double-beveled by flame cutting, rolled to diameter, and seam welded. The flanges are fitted to the cylinder, tacked, and the assembly mounted on a positioner for welding.

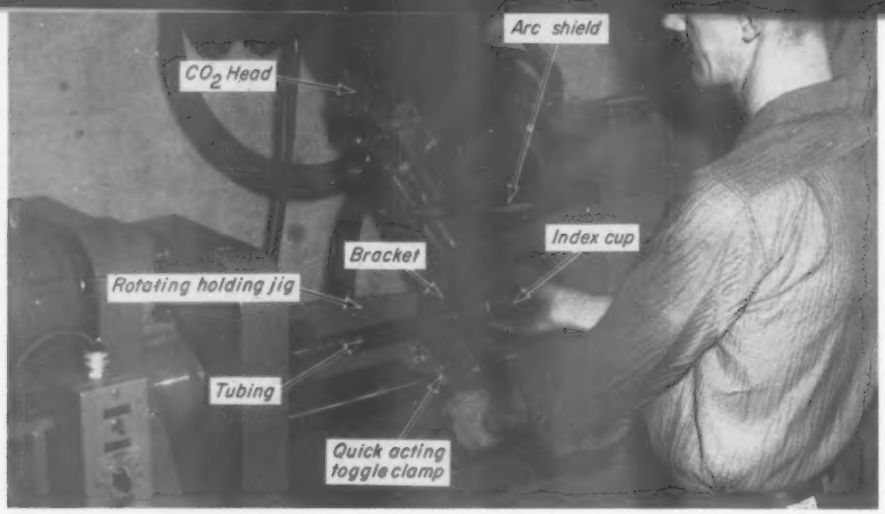
Keeping distortion down on the valve body is done

continued on page 74

Valve welding details

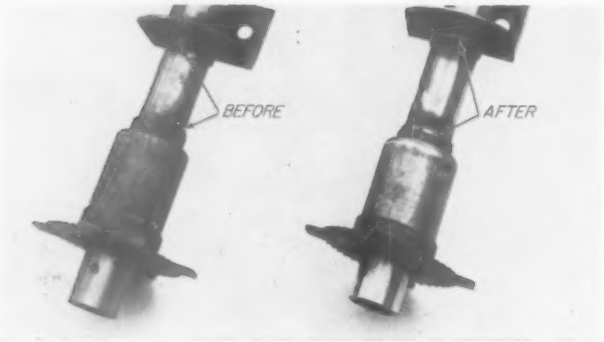
	Discs	Bodies
Machine	600 amp, d.c.	600 amp, d.c.
Current	400 amps	350–375 amps
Voltage	30 volts	30 volts
Flux	7% Chromium enriched	Grade 20X20X200
Wire	3/16", Type 25–12 Stainless	1/4", Low alloy steel 0.15C, 2% Mn
Travel speed	10 ipm	10 ipm

the set-up . . .



OPERATOR LOADS assembly in automatic welder; quick-acting toggle clamp is used.

the part . . .



UNRETOUCHED PHOTO shows welds originally made by spot welding and those made in new automatic operation.

CO_2 Welding Set-Up Makes Two Joints In One Automatic Cycle

IN BRIEF: New automatic welding set-up turns out 35,000 units per month on a one-shift basis; and, joints are stronger and better looking.

THE HIGH PRODUCTION needed by appliance manufacturers has resulted in some interesting and ingenious automatic welding machines.

A recent welding problem solved by the Cecil C. Peck Co., Cleveland, is typical. It was necessary to weld a stamped anchor bracket and an index notched cup, to a shaft housing tube. The index cup positioned relative to the bracket was critical. At one time, the parts had been spot welded to the tube. (See photo showing comparison) Peck's new machine accommodates various tube lengths and differently spaced brackets and index cups. The job called for 16 gauge tube steel up to 23 inches long. The brackets and cups were made of 14 gauge steel.

High production and a smooth, quality weld was required. Production requirements were 35,000 per month on a one shift basis.

An analysis of the job determined that the main holding jig be fixed to a rotatable tail stock which in turn was geared to the rotating head stock. Two V-blocks mounted on the holding jig center the tube. Anchor pins locate the bracket and a quick-acting clamp locks the tube and bracket assembly in place.

After the tube is locked, an air operated plunger in the head stock locates and positions the index cup. The air valve that controls the plunger is located near the operator.

Welding cycle control buttons are also located near the operator. As operator pushes the button to start weld cycle, the welding head moves into position, the arc shield lowers in front of the work, and the shielding gas valve is opened. The head and tail stocks (with work clamped in position) make one complete revolution to weld the index cup to the tube. Then, the welding head is automatically moved to the second position by an air cylinder. An arc is then struck and the head and tail stocks again make a single revolution, completing the bracket-to-tube weld.

After welding, the head retracts and moves back to first position and the arc shield moves up and out of

continued on page 74

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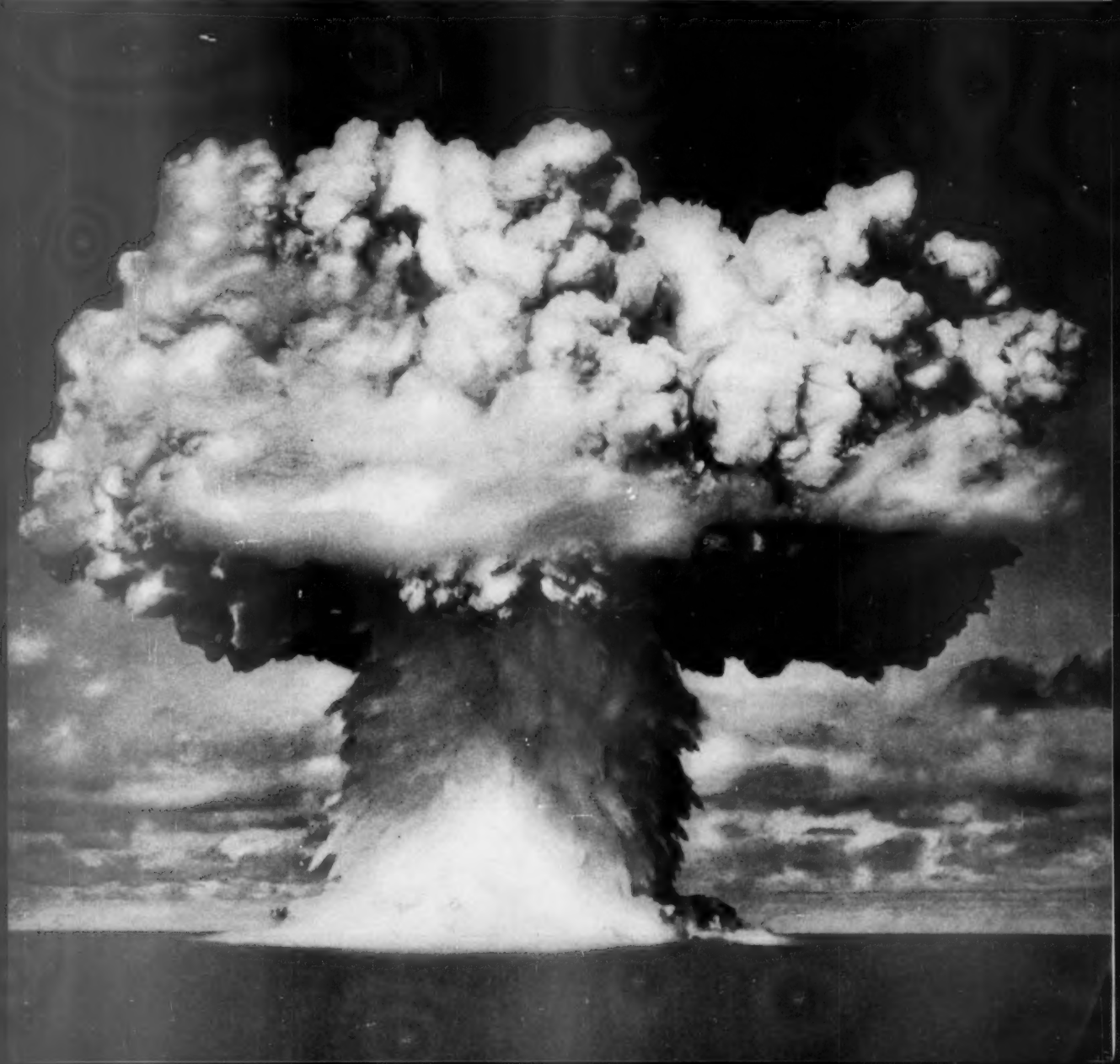
World's toughest test withstood by M&T Murex ELECTRODES

Behlen Frameless Metal Buildings have survived what's probably the world's toughest single test—a nuclear explosion. One of the prefabricated buildings was placed only 6,800 feet from blast center and remained erect. A duplicate building 15,000 feet away suffered almost no structural damage. In welding the components used in constructing churches, plants, schools, supermarkets, commercial and farm buildings, Behlen Manufacturing Company relies heavily on Murex electrodes – products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

MUREX
PRODUCTS FOR BETTER WELDING



Hot Strength Of Welded Carbon Steels

DESIGNERS KNOW *the room temperature properties of low carbon steels and the strength of welds in them. But what happens when weldments get hot—from boiling water or stress relief heats? Make educated guesses, beef up sections and welds, and let costs shoot up.*

Here is help. The hot properties of several carbon steels welded in different ways are adapted with the American Society For Testing Material's permission, from their publication "Elevated Temperature Properties of Weld-Deposited Metal and Weldments", STP 226.

MATERIAL AND WELDING DATA	Temp. °F	Yield (1) Strength 1000 psi	Tensile Strength 1000 psi	Elong. % 2"	R.A. %	Location of Fracture
Type: Carbon Steel C Mn Si N O H **Weld Chemistry, %:** .065 .32 .09 .019 .087 .0012; .0006 **Process:** Metallic Arc (Manual), No pre- or postheat. **Electrode:** Coated 1/8" **No. of Passes:** 8 Current: **Current:** 220 amps, 32 volts, Str. polarity **Groove Design:** Single Vee, 40° included angle, 3/8" root gap, backing. **Specimens:** All-Weld Metal			**As Welded**			
	Room	58.2	68.15	28.0	60.0	
	200	50.3	67.6	19.6	55.3	
	300	—	88.3	19.8	44.8	
	400	—	89.5	26.8	48.2	
	500	41.75	82.8	30.0	42.5	
	600	37.6	74.7	37.2	62.8	
	800	33.5	52.6	40.3	70.2	
	1000	24.5	31.7	48.2	80.5	
	1200	14.35	16.43	93.6	93.0	
	1400	7.12	7.52	95.3	87.8	
			Stress Relieved 1200°F, 1 hr.			
	Room	53.3	65.4	34.2	66.8	
	200	47.1	64.0	21.5	61.4	
	400	47.8	89.5	21.8	37.6	
	600	34.0	70.8	36.9	51.0	
	1000	25.6	33.35	48.7	81.2	
	1400	7.66	8.04	102.1	86.8	
Type: Carbon Steel Plate C Mn Si **Weld Chemistry, %:** .12 .66 .24 **Process:** Metallic Arc (Automatic) **Filler Wire:** Classification E 6030 **Groove Design:** "V" scarf **Post Heat Treatment:** Stress relieved at 1180°F **Specimens:** All-Weld-Metal	Room	49.7	65.0	35.5	64.7	
Type: ASTM A-201, Grade B, 1" hot rolled plate C Mn P S Si **Chemistry, %:** Base metal- .19 .57 .023 .034 .19 Weld- .08 .55 .035 .021 .37 **Process:** Metallic Arc (Manual) **Electrode:** Classification E 7016, 5/32" Root pass, 1/8" finish. **Current:** 5/32"—140-150; 1/8"—165-175 **Groove Design:** Double Vee, 60° angle, 1/16" land, 1/8" root gap. **Specimens:** Across-The-Weld	400	37.2	67.5	18	48	Base Metal
	600	34.4	72.8	21	46.5	Base Metal
	800	32.6	54.8	27.5	61	Base Metal
	900	30.6	43.4	28.5	69	Base Metal
	1000	22.6	31.1	39	73	Base Metal
Type: ASTM A-201, Grade B, 1" hot rolled plate C Mn P S Si **Chemistry, %:** Base metal- .19 .57 .023 .034 .19 Weld- .12 .96 .025 .034 .14 **Process:** Submerged Arc (Automatic) **Filler Wire:** No. 36, 1/4; 1/4 Unionmelt No. 80 Flux **Current:** 1300; 1000 **Voltage:** 36; 34 **Welding Speed:** 11, 15 ipm **Groove:** Double Vee, 90° Angle, 1/16" land, zero root gap **Specimens:** Across-The-Weld	Room	40.0	66.75	24.5	55	Base Metal
	400	36.25	76.0	14	39	Base Metal
	600	36.7	71.7	20	49.6	Base Metal
	800	30.8	54.6	25	62.4	Base Metal
	900	27.9	44.7	26	68.1	Base Metal
	1000	23.5	32.8	38	73.2	Base Metal
Type: API Grade B (H40), 10 3/4" diam pipe, .350" wall C Mn P S **Base Metal Chemistry, %:** .26 .75 .011 .033 **Process:** Electric Resistance **Groove Design:** Longitudinal Weld Seam **Post Heat Treatment:** 1000°F, 2000 hrs. **Specimens:** Across-The-Weld	Room	47.4	67.0	16		
	Room	46.4	61.9	8		
	Room	48.0	68.5	20		
	1000	23.8	34.5	21		
	1000	27.7	35.4	26		
	1000	28.8	35.7	23		
			Base Metal Properties			
	Room	50.3	67.0	36		
Type: ASTM A-201, Grade B, 1" hot rolled plate C Mn P S Si Al **Chemistry, %;** Base metal- .19 .57 .023 .034 .19 .0022 Weld- .07 .41 .024 .025 .04 **Process:** Metallic Arc (Manual) **Electrode:** E 6010, 5/32" Root pass, 1/8" Finish **Current:** 5/32"—140-150; 1/8" 165-175 **Groove Design:** Double Vee, 60° angle, 1/16 in. land, 1/8 in. root gap **Specimens:** Across-The-Weld	Room	37.2	66.0	21.4	22.4	Weld
	400	37.9	65.0	7.5	15.2	Weld
	600	32.5	70.5	28.1	56.4	Base Metal
	800	32.5	53.5	21.9	45.6	Weld
	900	28.5	43.0	27.8	58.9	Weld
	1000	21.0	32.5	32.0	75.6	Weld

(1) 0.2% Offset.

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World's safest safe welded with M&T Murex ELECTRODES

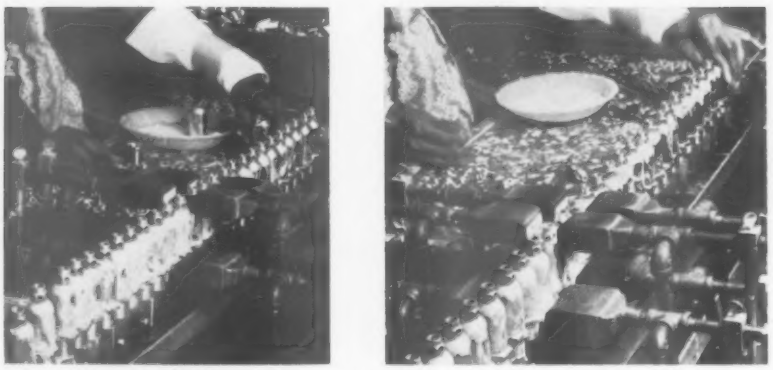
Guarding the nation's most treasured documents is a job entrusted to what is probably the world's safest safe. At night the safe automatically lowers cases containing the Declaration of Independence, the Constitution and the Bill of Rights into its own interior, locks mammoth doors. In its construction, the Mosler Safe Company depended on M&T Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

MUREX
PRODUCTS FOR BETTER WELDING

these air valves were designed to be made by brazing

COMPLETED air valve and components are shown (left). Brass air valve (right) ballooned out under pressure of 5,000 psi, but brazed joints held.

this brazing line turns out 500 valves every hour at less than a nickel a piece



OPERATOR ASSEMBLES air valve parts and positions prefluxed brazing rings (left); assemblies are put on metal-link continuous conveyor for trip past gas-air burners.

Brazed Valve Joints Withstand 5,000 psi

by **ELLIOT FRANK,** *president, Flair Manufacturing Co., Brooklyn, New York*

IN BRIEF: Mechanized brazing turns out 500 air valves an hour at a cost of less than a nickel each.

BECAUSE WE DESIGNED for brazing, we can assemble 500 air valves an hour for less than a nickel each. And, we have never had a field failure in a brazed joint. In one case, a valve ballooned out under about 5,000 psi pressure—far beyond its design pressure—but the brazed joints held.

The valves go into a high point of a line that carries water at 180°F to 210°F. They are designed to release air as it accumulates. The valves contain a special gasket which swells when wet and contracts when dry. As air accumulates, the gasket dries out. This lets the air escape. As water again rises in the valves, it wets the gasket which swells to seal the outlet again.

We chose brazed design as the most economical and direct method of fabrication. This design is more reliable than others using threading or soft soldering and mechanical joining. It costs about 25 to 30 percent less.

The valve consists of a drawn brass body and a screw-machine base and head. The base has a threaded nipple and hexagon lip for screwing into the water line.

The body and ends are assembled at a bench where preformed, prefluxed silver brazing alloy rings .040-inch in diameter are positioned.

The assemblies are placed on simple, plug fixtures mounted on a metal-link continuous conveyor. This

continued on page 74

Circle No. 52 on Reader Service Card. ⟶

World's best cars welded with M&T Murex ELECTRODES

More than one out of every four cars produced in the United States—the world's best—is welded with M&T Murex electrodes. For joining frames, or unitizing bodies, the people who build the best cars depend on the best welding materials—products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

MUREX
PRODUCTS FOR BETTER WELDING

save!

Push the button—and save up to 10% on oxygen costs, up to 30% on fuel gas costs . . . with SMITH'S money-saving push button gas control unit! Two additional advantages: it saves on labor costs—16% in a typical case history . . . also improves cutting quality by reducing burnover; improves welding quality by reducing pinholes and slag inclusions and gives better puddle control. SMITH'S gas control unit instantly reduces the high pre-heat flame you need to start many cutting, welding, silver soldering, production brazing, and heating operations to the lower flame you need to complete them. Makes an ideal shut-off valve for inert gas welding, heavy heating and flame hardening equipment. It works on a solenoid-operated valve, plugs into any 110 volt outlet. Use with as many as 8 machine torches (pays for itself over and over again). Available with either hand or foot operated remote control for maximum convenience. See your welding supply distributor, or write:

PUSH-BUTTON GAS CONTROL

SMITH WELDING EQUIPMENT CORPORATION

2621 Fourth Street S. E., Minneapolis 14, Minn.

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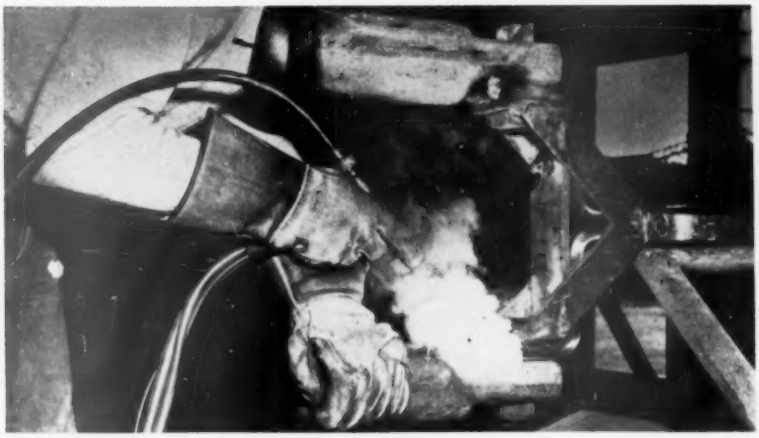
AFTER PREHEATING, operator joins mild steel bracket to copper anode.



AT ANOTHER STATION, an operator welds mild steel hub to leg of copper anode.

Consumable electrode welding process joins copper to steel

by **THOMAS K. FEATHERINGHAM,** *v.p., Youngstown Welding & Engrg. Co.*

IN BRIEF: Consumable electrode gas shielded arc welding and copper filler wire are key to successful joining of copper to steel.

WELDING COPPER to steel is an unusual job. But, our Youngstown, Ohio, firm has been joining these metals on a production basis. We're fabricating copper anode bar assemblies for use in making aluminum.

These assemblies are used in Ormet Corporation's aluminum reduction plant in the Ohio River Valley. They support the carbon anodes used in aluminum reduction pots. Each stub is attached to a 210-pound carbon anode block with a poured cast iron sleeve. An assembly is installed in a pot by clamping the copper bar to the anode bar and suspending the two 210-pound carbon anodes in a bath of molten cryolite. Current flows through the assembly to the cathode of the pot, electrolyzing aluminum from aluminum oxide.

In our production line, a copper bar is first split at its base. It is formed into an inverted Y-shaped anode. A V-shaped mild steel bracket is then placed over the top of the inverted Y, preheated and welded to the anode using the consumable electrode gas shielded arc welding process. Once the bracket has been joined, two forged mild steel stubs are bolted to the legs of the anode. These are welded in place at welding stations further down the production line.

We make all welds with a Linde SWM-2 portable Sigma welder at a current setting of 300 amps, direct current and straight polarity. A deoxidized copper wire is used. This wire contains 1.5 silicon, 1.0 manganese, .65 tin and .05 lead.

We use an argon-helium gas mixture to protect weld zones from atmospheric contamination.

The high-quality welds are made at 25 ipm. • •

World's toughest ...safest ...best

You won't always find welds by M&T Murex electrodes in the world's toughest, safest or best equipment. But you'll surely find them in the world's most carefully manufactured.

Murex electrodes comprise one of the broadest lines of quality rods and wire. Choose from over 1000 types and sizes —mild steel and low alloy, stainless, hard surfacing, etc. Ask the M&T man or send for free literature. Also for information on M&T's complete line of welding machines. METAL & THERMIT CORPORATION, Rahway, N. J.

MUREX
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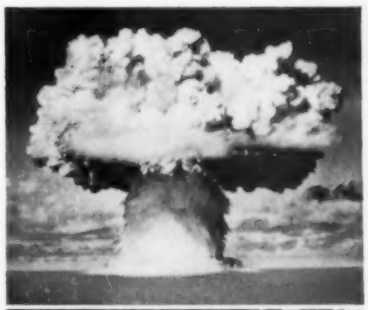


Circle No. 53 on Reader Service Card.

COVER STORY

AFTER WELDING and stress relieving, engine case made from an air-hardenable 5-percent chromium steel is heat treated in giant pit furnace at 1900°F. Hoist is hooked to top of case (left) and it is raised from furnace (left to right).

Solar Aircraft fabricates rocket engine cases from low-alloy high-tensile steel because they are weldable and can be heat-treated to high strength levels after welding . . .

Heat Treating Low-Alloy High Ten

IN BRIEF: Key to heat treating rocket engine cases is a controlled-atmosphere pit furnace that can accommodate assemblies up to 9-feet in diameter and 30-feet long.

A GIANT, controlled atmosphere pit furnace lets Solar Aircraft Company, San Diego, California, heat treat king-sized welded rocket engine cases. The only facility of its kind in this country, the pit furnace is 11-feet in diameter and 31-feet deep. It can handle assemblies up to 9-feet in diameter and 30-feet long and can take a load up to 10,000 pounds. It develops heats up to 1950°F. Although it is currently being used only for heat treating, Solar expects to do considerable furnace brazing in it in the near future.

MATERIALS

Solar fabricates rocket engine cases from several grades of low-alloy high-tensile steels, including chromium, chrome-molybdenum and chrome-nickel-molybdenum alloys. These materials are used because they are weldable and can be heat-treated to very high tensile levels after welding.

METHODS

A typical example is the engine case shown in the photographs above. This is made from an air-hardenable 5-percent chromium steel. The weld areas of the case were preheated to 600°F using thermostatically controlled elements in welding back-up bars. Weld areas were stress relieved at 1200°F for two hours by means of induction blankets after the welds were completed. Then the case was heat treated at 1900°F in the furnace.

All joints in the case are butt joints. These are carefully prepared to get near-perfect fit-up. Contaminants are carefully removed from weld areas before welding.

In welding a material like this, one that is to be heat treated to high strength levels, a filler wire nearly identical with the base material is used. The

e Steel Weldments

engine case shown here was welded with the tungsten inert gas process.

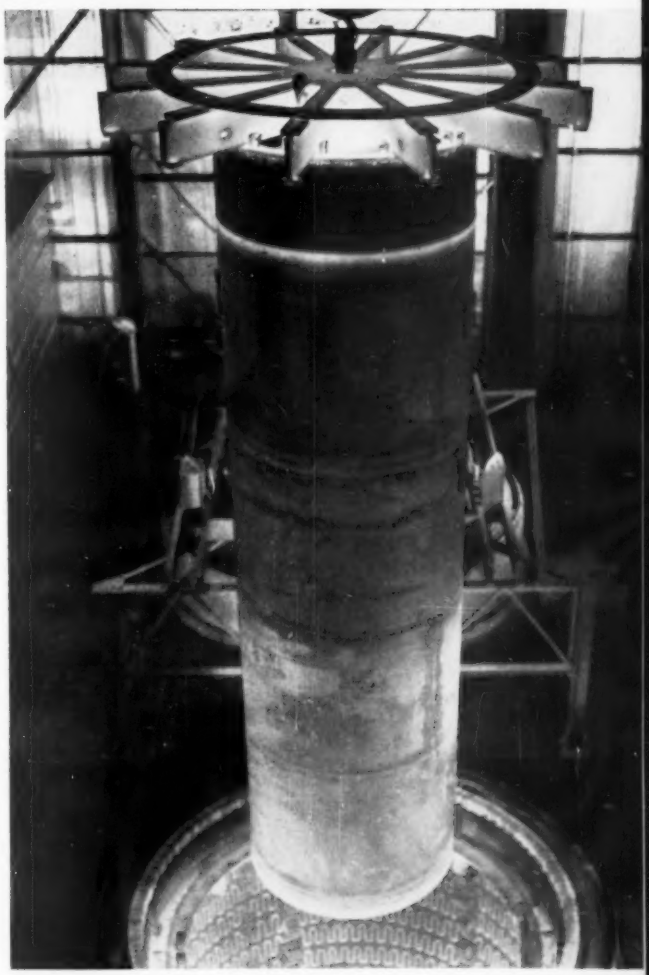
EQUIPMENT

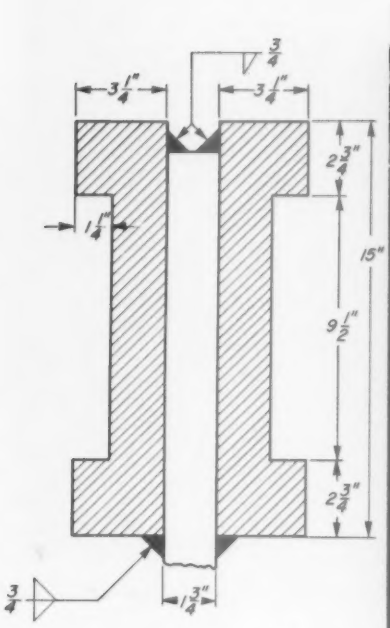
Lined with refractory brick, the furnace is heated electrically, using 1000 kilowatts of input power. There are five heating zones from top to bottom: one master and four slaves. The master zone is programmed and the slaves follow. When any zone gets hotter than the master, it will shut off until the temperature is uniform in all zones.

The furnace has two doors, or covers, which move on tracks at right angles to one another. In heat treatting, one is used for the hardening, the other for the tempering part of the operation. The door used for tempering contains a 50,000 cubic foot per minute recirculating fan, and permits temperature control to plus or minus 10°F.

The covers are sand sealed.

Various gases, including hydrogen, argon and endothermic gas, are used for protective atmospheres. • •





UPRIGHTS, machined from alloy steel slabs, are welded as sub-assemblies to heavy plates (above) then joined to truck center section with heavy fillets.

Heavy Plate Fabrications Used In 60,000-Pound Steel Lift Truck

IN BRIEF: Heavy plate fabrications give Elwell-Parker's steel mill lift truck all the strength it will need in service. The company combined carbon and alloy steels in light and heavy thicknesses to gain strength where it was most needed. Special welding joint designs were used.

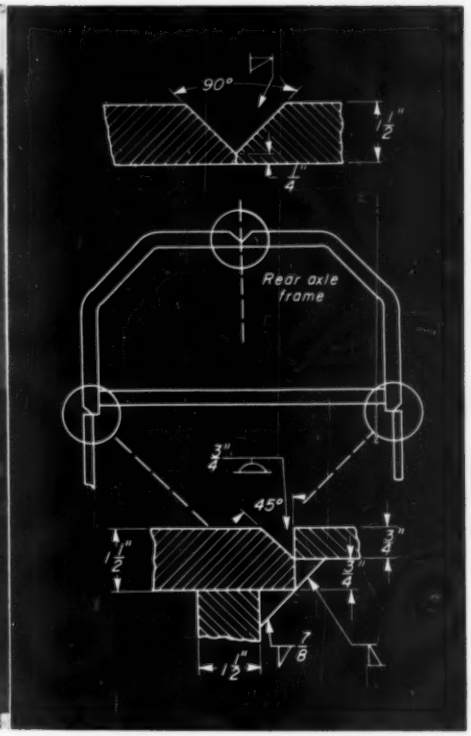
YOU CAN'T DODGE welded design when you make a truck that operates under severe conditions. This is the story of a 60,000 pound capacity split ram truck that's used for handling metals in the steel mill.

The Elwell-Parker Electric Co., Cleveland, built one. Louis Stasun, assistant factory manager, said the hardest job was handling the weldment. They used four chain hoists, traveling the length of the bay on overhead tracks (see photo), to position the work for welding.

Stasun said that all their industrial trucks have center-sill construction. The drive axle, steering axle, uprights, etc., are attached to it. Surrounding the center sill is a skirt of heavy welded steel plate. It adds strength and protection and speeds removal of axles for inspection and maintenance.

The rear axle frame has 3-main pieces fabricated from 1½-inch thick mild steel plate (see sketch B). E-P flame cuts and bevels all heavy plate for welding. A press brake is used to bend the two pieces which form the frame's C-section. When tacked together with the third plate the frame becomes a D-section.

E-P used 5/16-inch E 6024 iron powder electrodes to weld the rear axle frame. Stasun said that this high speed electrode was picked because it gave them excellent bead appearance and was self-cleaning. The D-section welds were made in a horizontal position—with the a.c. welding machine wide open (600 amps). At this high amperage, the electrode holder got mighty hot. So the operator used two—when one got too hot his switched to the other.



FOUR CHAIN HOISTS are used to position the rear axle frame for welding. This section is composed of two bent sections and a flat plate, welded with E 6024 electrodes using the above joints.

The front axle section was made of 5/8-, 3/4-, 1-, and 1½-inch thick mild steel plate. These parts were flame cut first, then formed in the press brake. The two key parts, forming the center section, were made from 1½-inch thick plates and welded to the front axle section. They act as main supports for the load-carrying uprights

E 6024 powdered iron electrodes were used on the 5/8- and 3/4-inch fillets These welds took 3, 4, and 5 weld passes. The lighter plate sections took single-pass fillets.

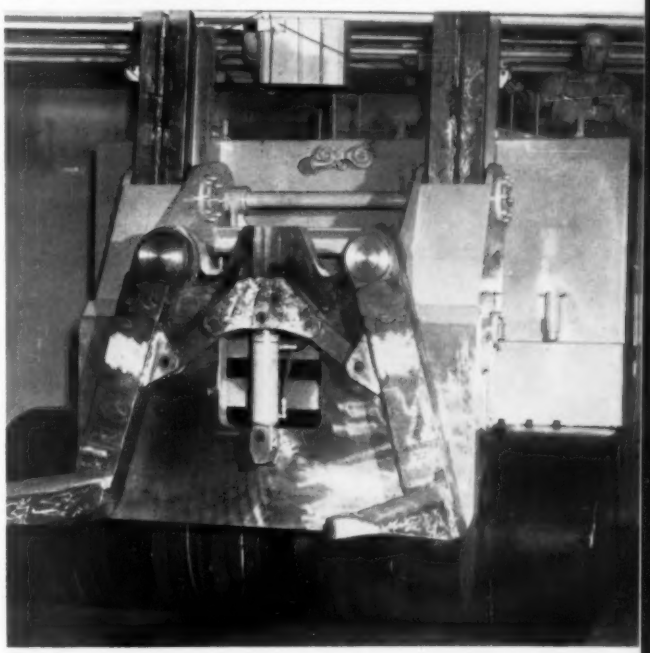
The total weight of the front and rear axle sections was about 35,000 pounds. The front half scaled 17,000 pounds, the rear half, about 1000 more.

WELD TO CLOSE TOLERANCES

Many special components, including uprights and brackets are constructed of medium carbon or alloy steels. The uprights, important parts of this 60,000 pound ram truck were machined from special alloy steel slabs, then welded to the center section. After welding, inspectors found that the uprights were out less than 1/32 of an inch (see sketch A).

E 7016 low hydrogen electrodes were used to fillet weld uprights to the center section. The fillet size was 3/4-inch. Tie bars clamped across upright maintained alignment during welding. • •

THE FINISHED PRODUCT has enough beef and muscle to handle 60,000 lb. loads of streel around the mill—time after time. It's built to take it—and to come back for more.



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Specialists? Yes, From creative founders to progressive management, scientists, engineers, technicians, metallurgists, skilled factory craftsmen, and 350 specially trained Technical Representatives in the field, Eutectic Welding Alloys Corporation is an army of specialists. Specialists in helping users of EUTECTIC products to utilize the most modern welding alloys and aids known today . . . products that save time and money, minimize warpage, distortion, and weld embrittlement through Low Heat Input, and assure consistently successful results.

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For More Information Circle No. 28 on Reader Service Card.

EDITOR'S NOTE: The discussion of welded codes began in our July issue. In an article ("Unreasonable Codes Discourage Welded Design"), J. F. Lincoln, chairman of the board, Lincoln Electric Co., said that unrealistic standards discourage the use of welding in buildings, bridges and fabrications and hamper the redesign of castings and forgings, preventing billion-dollar savings that could result. We have received many letters about this industry problem—some are presented on these pages. Many offered suggestions for correcting this situation; some agreed and others disagreed—in part—with Mr. Lincoln. Others obviously read things into his statement and misconstrued it. One of the most interesting suggestions came from Howard Cary, director of Hobart Brothers Technical Schools. He said why not have . . .

A Single Code For All Welding?

IN BRIEF: The remainder of Mr. Cary's letter follows. In it he makes suggestions on how to reduce the confusion surrounding the use of codes and tests and further the acceptance of welding.

THE ADMINISTRATION of welding codes and specifications and the future of the welding industry is of vital concern to us. We feel that welding is finding more acceptance daily due to its ability to produce joints that utilize the full strength of materials and due to its inherent economies. At the same time we encounter new specifications and find that more weldments are being placed under the jurisdiction of various codes and specifications.

The welding code controversy has been raging for many years and perhaps now is the time for constructive action. Welding codes and standards are specifications written to provide a means of establishing and assuring specific quality requirements. Such codes are usually written by groups interested in protecting the public or for maintaining minimum quality standards. They are primarily used by purchasers and users of welded products and many times form the basis for price. Codes are not written to hamper the use of a particular manufacturing process but to protect the life and property of the public. Those responsible for purchasing and using weldments produced under code are rarely those who severely criticize the codes. Those who severely criticize welding codes are usually in the welding industry but it is questionable if they would remove or eliminate the quality control specification that they employ in purchasing or inspecting materials they utilize in their own products.

We believe that much can be done to reduce the confusion surrounding the use of codes and tests which can further the acceptance of welding. The prime objective, of course, is to gain universal confidence in the welding process for every possible application. Acceptance has been gained in many fields to the point that welding is the only process considered. In other fields welding does not occupy this favorable position.

The American Welding Society has done a notable job of standardizing the welding provisions in the different codes. Much more work of this nature needs to be done. Many people in the welding industry criticize welding codes but too few of them know what these various codes contain. An objective should be to provide more knowledge and better understanding of the provisions of the different codes. It is true that those involved with one code or codes covering similar work become extremely familiar with the specific requirement of that code. It is only when a number of codes are considered together that they become confusing.

It seems in order to briefly summarize the provisions found in many of the codes so that we can better offer suggestions for improvement. Briefly most welding codes contain: scope, welding definitions, welding specimens and testing methods, design considerations including joint design, welding electrodes and base metals, inspection jurisdiction and acceptability standards, the qualification of processes and procedures and the qualification of operators. These last two factors

Mr. Cary's letter continues on page 52

Other industry leaders discuss welding codes . . .

"Studies of weld failures in major industrial installations indicate they are caused by factors that are usually overlooked: faulty design of engineers who do not understand welding or by slipshod welding done by organizations who will sacrifice quality to make an extra dollar.

"As a major industrial contractor, we must constantly meet codes of every type. We realize that some phases of these codes bear review, but our experience has proven that the so-called "unreasonable codes" should only be a minimum level for weld quality to meet today's industrial standards. **We feel the author, as well as representatives of welding and code committees, should concentrate on educating American engineers on the value of proper welding design.** Standards and enforcement of codes and laws should be increased to stamp out the "corner-cutter". Weld failures will then decrease and weld joint efficiencies can be reasonably reviewed."

R. H. Hoefler
Chief Welding Engineer
Kaighin & Hughes, Inc.
Toledo, Ohio

"The very fact that there are those who are not fully informed on the virtues of welding pinpoints the problem.

"I firmly believe that any process which is used in the manufacture of any product deserves the engineering and controls necessary to promote its development as a productive tool. Arc welding is no exception.

"We need standards and controls to control the variables which occur in arc welding. Also, the indifference of many production people, the cautious attitude of innumerable designers, the failure of manufacturers and fabricators to **recognize the fact that good welding must have its beginning on the drawing board,** has led to a condition which cannot be terminated by any lowering of standards."

Harold H. Hicks
Welding Engineer
International Steel Co.
Evansville, Indiana

"Almost without exception, architects and engineers will admit the superiority of weldments when used with proper design. When asked why this technique is not used, they often cite the shortage of qualified operators.

"If I were to make a stand, it would have to be on the other side of the argument. True, some inspectors and engineers are too exacting—especially when compared to other joining methods—but to let down the basic testing of operator techniques would be a mistake.

"Many times, through ignorance of building architects, I find myself bidding and competing with men who can barely strike an arc.

"Give the qualified operator a break through legislation, advertising or any other means available and these men will promote as no amount of unquestioning acceptance of welding will produce."

Harold E. Olsen
Unity Welding & Supply
Red Oak, Iowa

"There is a lot of welding performed by those who are not well informed. They do not always have the proper equipment. And, in some cases they do not have the integrity and honesty to see a job well done. For this reason, code restrictions become necessary. Only one weld failure can cause a catastrophe or wide spread loss of life. Public opinion will condemn such failures.

"In our own company we recognize the cost and wastefulness of excessive weld strength in joining metals. Our larger operations are in non-coded states where code design is not mandatory. Failure, however, is still not excusable. Catastrophic happenings and failures have caused our company officials to realize the need to establish working conditions wherein code regulations are maintained. The results more than justify the excess cost of complying with such regulations."

L. S. Wright
Engineering Department
Ashland Oil & Refining Co.
Ashland, Kentucky

"I was a welder for 18 years; 10 of these years were spent as experimental welding operator for the Navy Department. However, I am a welding engineer. It has been my experience that with the present welder qualification tests, operators are prone to cheat at times. So what would happen if they were allowed to weld without the weld being questioned? If welding was accepted without question, every Tom, Dick and Harry would start slugging welds in order to fill the grooves of a butt (which I have seen done many times when I was a Navy inspector) and still class themselves as welders."

John G. Willis
Woodbury, N. J.

MORE ABOUT WELDING CODES

continued from page 50

together with inspection requirements provide for the majority of the welding tests.

Some of the codes provide standardized joint designs which have been prequalified. **Additional work and research should be performed to provide prequalified joint designs for all requirements.** This would fulfill 95% of the designer's requirements, and would eliminate much of the expense involved in qualifying welding joints required of each contractor or manufacturer under certain codes.

Prequalification of welding processes and procedures could also be made more universal. The pipe welding industry has made signficant advances in providing prequalified joint designs and procedures which have greatly reduced testing expenses. This same arrangement could be made industry wide.

Reciprocity of welding operator qualifications is another potential area for reducing testing and allowing consequent savings. Here again the pipe welding industry through the National Certified Pipe Welding Bureau has made tremendous strides.

Before significant progress can be made in the above situations we must have more uniformity among the welding provisions of the welding codes. The Canadian Standards Association with their "Standard Specification for Welding of Bridges, Buildings and Machinery" have made notable advances in covering more applications with a single specification. Their "Welding Qualification Code for Application to Fabricating and Contracting Firms" has established a more uniform qualification procedure for welding operators and has even established qualification of welding supervisors.

A consolidation of requirements of the welding sections of codes, in existence in this country, which would cut across the various lines now established, would be very beneficial. **A possible objective would be a single welding code** comprising sections devoted to various applications or industries, and/or providing for various levels of quality. Testing procedures would be standardized with variations peculiar only to specific applications. In conjunction with such a code various levels of service requirements and various levels of acceptability with respect to radiography inspection, magnetic particle inspection, etc., would be established. The level of acceptability and/or applicable sections of the general code would then be a matter of agreement between purchaser and supplier.

In conjunction with this single general code would also be **provisions for welding operator qualification also at various levels of proficiency.** A pattern similar to that employed in licensing airplane pilots all the way from the learner's permit to the multi-engine type of license could be employed. Operator qualifications could allow for movement between employers without requalification. Adequate safeguards and records would be required.

It is agreed that many, many obstacles would need to be overcome to establish such uniformity however the ultimate would be the elimination of countless duplications of tests to qualify processes, joint designs and procedures. It would also eliminate duplications of tests to qualify operators for each new contract or with each new employer. The savings to fabricators would be enormous and the final result would be lower cost welding which would further its acceptance. These factors would ultimately reduce the amount of testing and the cost involved.

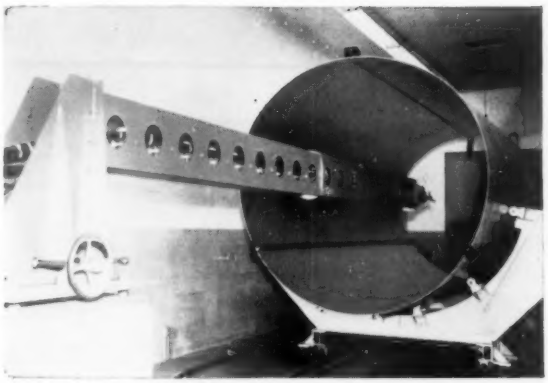
Welding codes and specifications cannot be eliminated because buyers daily demand and receive more quality in the goods they purchase. Even so, some people attempt to reduce quality and to produce goods that will not meet the service requirements imposed. Only by means of minimum standards can we maintain an orderly arrangement between buyer and seller that will protect the life and property of the public and retain public confidence in welding. • •

Howard Carey, director,
Hobart Brothers
Technical School,
Troy, Ohio

HOWARD B. CARY is director of the Hobart Brothers Technical School in Troy, Ohio. Established in 1958 by the Hobart Brothers Company of Troy, the non-profit school is devoted to teaching, research and development in the welding field.

Mr. Cary resigned his position as assistant general works manager of the Marion Power Shovel Co. to take this job. He joined the shovel firm in 1948 as a welding engineer. He became welding superintendent in 1951, general superintendent early in 1956 and assistant general works manager later that year. Prior to joining Marion, Mr. Cary worked for Battelle Memorial Institute in a research capacity.

A member of the American Welding Society, Mr. Cary has served as chairman of the Society's North Central Ohio and Columbus Sections. At present he is a member of the National AWS Welding Handbook Committee. Mr. Cary is president of the Marion Chapter of the Ohio Society of Professional Engineers and is a member of numerous other technical societies.



X-ray boom in position within the shell for radiographing weld seams in missile body.

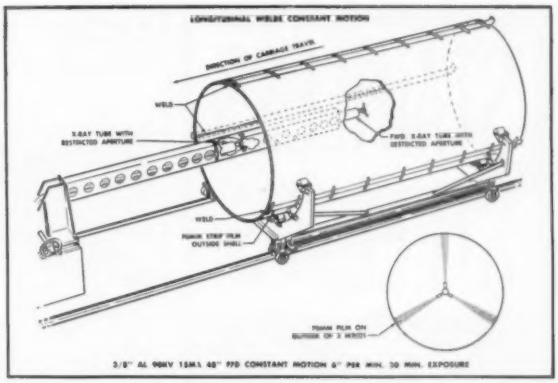
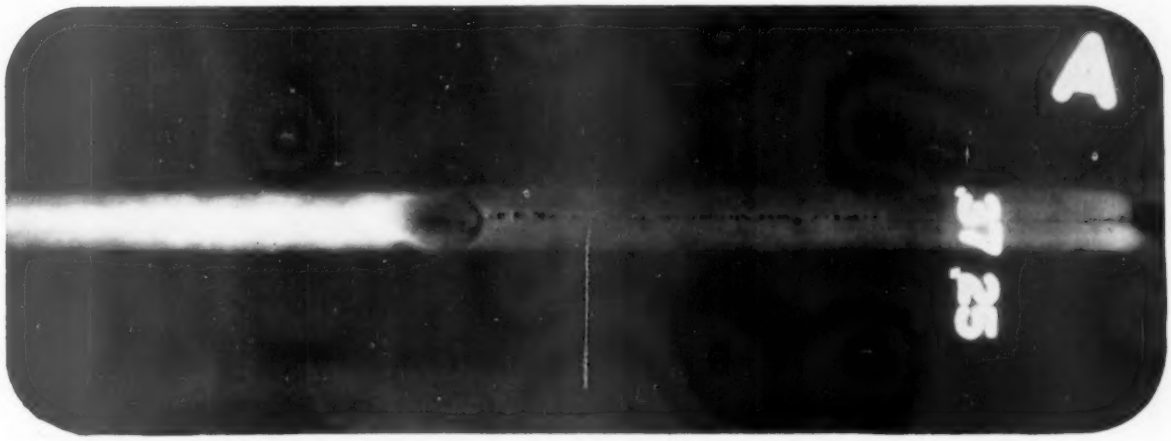

LONGITUDINAL WELDS CONSTANT MOTION
DIRECTION OF CARRIAGE TRAVEL
WELD
X-RAY TUBE WITH RESTRICTED APERTURE
FIXED X-RAY TUBE WITH RESTRICTED APERTURE
WELD
FILM ON OUTSIDE SHELL
FILM ON OUTSIDE OF 3 WELDS
3/8" AL 90KV 15MA 40" FFD CONSTANT MOTION 6" PER MIN. 30 MIN. EXPOSURE

Diagram shows how three longitudinal seams are x-rayed simultaneously.



Radiograph revealed crack and porosity which must be repaired.

Three hour x-ray job cut to thirty-five minutes

To speed Air Force missile program, Douglas develops unusual exposure technique

Ordinarily the longitudinal weldments of the three segments making up this missile tank would be radiographed by an external source using successive exposures of individual film cassettes mounted along the weld inside the tank.

To meet production schedules and reduce costs, Douglas Aircraft Co. devised the method shown in the diagram. Strips of 70mm Kodak Industrial X-ray Film are placed along the welds on the outside of the tank. Two rod-anode type x-ray tubes, fixed on a boom extending within the shell, project x-rays through lead slits to all three weldments. In making the exposure, the tank is moved half its length by electric drive, each half passing through the radiation of one of the x-ray tubes.

Using Kodak Industrial X-ray Film, Type AA adds to the savings in time—for this film has the extra sensitivity and speed to allow shorter exposure.

In all applications, Type AA Film is producing quality work in less time—also extending the service of present x-ray equipment. To see how you can save time and money, discuss it with your Kodak x-ray dealer or write for a Kodak Technical Representative to call and talk it over with you.

Kodak Industrial X-ray Film, Types AA, M, and KK are available in 70mm by 550 ft. as well as in standard size packages of 75 or 100 sheets.

X-ray Division, EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Kodak
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STAINLESS STEEL welding scale & oxide go off with

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LIQUID CHEMICAL FORMULA 536

Costs far less than obsolete hand methods.

No more costly, time-wasting hand compounding, grinding and sanding. OX-OFF 536 acts *in seconds.* Just dip small stainless steel pieces in 140°F bath—OR stroke large pieces with electric applicator . . . welding scale and oxidation go fast and completely from surfaces and crevices.

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ALUMINUM

Removes oxides from Aluminum by a mere wipe or dip...WITHOUT PRE-CLEANING.

Write for Tech Bulletin IW-10 or see your welding distributor.

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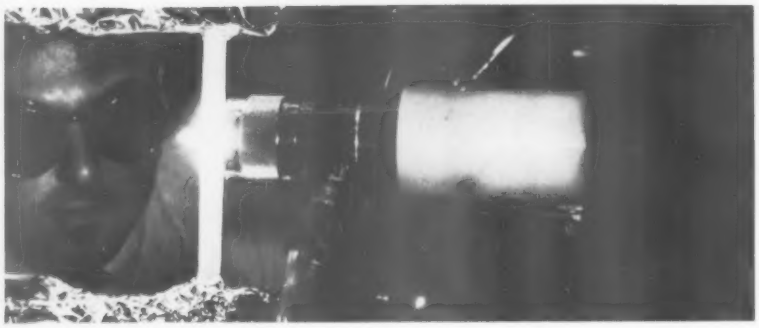
NEW PRODUCTS



Small Plasma Unit Fires Ultra-Hot Flames

A new 9-inch long, 3½ lb. plasma generator capable of producing ultra-hot flames for laboratory and production use, has been announced by the Avco Research and Advanced Development Division. Powered by a standard welding generator, the new unit may be used to spray refractory oxides and ceramics onto other materials to greatly increase their refractory properties or for flame cutting or material testing.

In flame spraying, the powdered material is fed into the flame, becomes a liquid and is hurtled in fine droplets against the work surface

The unit, which can be fired into a vacuum or pressure chamber with little change, uses commercial argon, nitrogen or helium and tap water for cooling. It may be operated almost continuously at 5 kw power level.

It has a water cooled tungsten cathode and a copper anode. The jet can be varied by changing nozzles (0.25 to 0.50-inch I.D.).

Circle No. 150 on Reader Service Card.

Portable AC Welders

A new line of easy - to - operate, sturdily constructed, portable AC welders has been designed by Emerson Electric Mfg. Co. for time saving, on-the-spot farm repairs and all-around farm welding jobs. These machines can be easily mounted on a truck or trailer.

Welders are built to the same standards as large industrial welders in 90-180 and 295 amps with double glass-insulated copper coils, dipped in varnish and backed for longer life. Machines can cut and weld almost any size metal and can be used with AT-1 twin carbon arc torch for soldering, brazing and heating.

Circle No. 151 on Reader Service Card.

Electrode Pressure Gage

A new gage to measure electrode pressure in resistance welding equipment is announced by the Instrument Control Company. The gage will measure up to 2500 pounds per square inch. In multiple gun press welders, several load cells can be set in position, and pressures read with only a single dial indicator.

Circle No. 152 on Reader Service Card.

8-Ton Punch Press

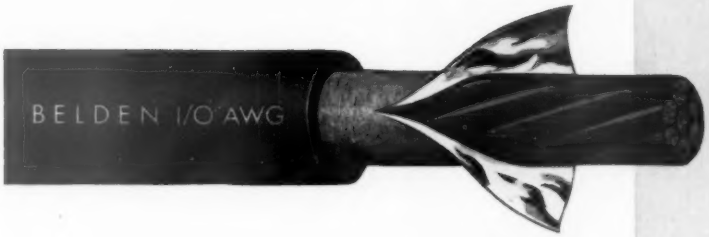
Alva Allen Industries has announced a new power press rated in between their 5- and 10 ton-sizes.

The new Model BT-8 is available with die space of 8½" shut height and 10" throat, capable of taking large size work normally requiring big, expensive presses. Press can be set up to do any punch press operation in many materials.

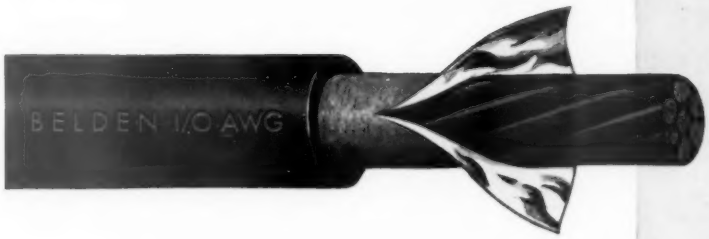
Circle No. 153 on Reader Service Card.

FACTS AT YOUR FINGERTIPS: *Do you want full information on the latest welding products shown on these pages? Just circle the appropriate number on the bound-in readers service card and you'll get it.*

Belden Welding Cable
the Complete Line



O.T.R. Rubber-Jacketed Cables
Oil-tempered rubber gives the best balance between easy handling, flexibility, and resistance to the effects of oil, heat, cold, and mechanical abuse.



Neoprene-Jacketed Cables
Resist oil, grease, heat, sunlight, mechanical abuse, and ozone set up by high frequency welding or atmospheric conditions.

HVF Vinyl Plastic-Jacketed Cables
High voltage-frequency vinyl insulation affords perfect resistance to corona and ozone cracking . . makes this cable ideal for high frequency welding. High resistance to abrasion, oil, and impact.

Whip Lead Cables
Hawser lay construction of conductor makes this cable extremely limp and manageable . . minimizes operator fatigue. Jacket won't pull away from electrode holder. Neoprene insulation.

plus rubber-jacketed welder power supply cords

ask your welding supply distributor

one wire source for everything electrical and electronic

magnet wire • lead wire • power supply cords • cord sets • portable cordage • electronic wire • automotive replacement wire and cable • aircraft wire • electrical household replacement cords

Belden
WIREMAKER FOR INDUSTRY
SINCE 1902
CHICAGO

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For More Information Circle No. 16 on Reader Service Card.

GB 88 FLUX.. available in 3 oz., ½ lb., 1 lb., 5 lb. jars and 25 lb. drums to suit your needs

Use GB 88 Flux, the flux of proven dependability and note the improvement in the quality of your Silver Brazing. GB 88 is fully active to 1650°F.

Low glare and low fuming characteristics insure operator comfort and quality results. It is stable in use as well as in storage and was developed for Silver Brazing of STEEL, BRASS, COPPER, STAINLESS STEEL, MONEL, NICKEL, INCONEL, CHROME ALLOYS, SILVER and GOLD.

For best results team up GB 88 Flux with GB Silver Brazing Alloy in the form or size you require: random coils (all diameters), strip, straight lengths, pre-formed rings and special shapes. Prompt service on all inquiries.

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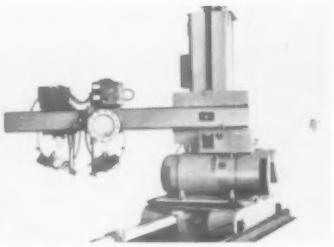


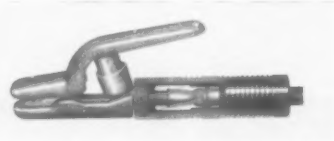
Welding Manipulator

A new mechanized welding head manipulator for automatic welding has been announced by the World Electric Co. Trade named the "Robot", this Welco manipulator is said to be ideal for fillet welding of tapered building columns, cover plates, bridge girders and other structural fabrications. It features simultaneous boom, carriage column and base travel. It can be furnished with either single or dual heads for floating or fixed operations.

The head, base and column operation is easily controlled from the operator's control pendant by one man.

Standard models are available with from six to 15-feet of vertical travel and six 20-feet of horizontal arc travel. The speed range is 25-1 with a weld speed of 5-25 ipm.

Circle No. 154 on Reader Service Card.



Holders Have Mechanical Cable Connection

A completely new mechanical cable connection is featured in Jackson Products' new arc welding electrode holders, Series ST (for Sealed Tight). Tongs are of heat treated 98% copper alloy. This cable connection is said to be quickly made and to allow no strain on the cable strands, nor peel-back of the cable jacket through flexure or tension, and will last the lifetime of either copper or aluminum cable.

The lower tong is threaded to receive a connection nut and terminates in a silver-plated point. When the

nut is tightened, the stripped cable strands are spread equally and smoothly around this point, sealed tight against moisture and dirt.

The connection nut extends to form a ferrule around the cable jacket and is available to fit cables No. 1, 1/0, 2/0 and 3/0. The ferrule is crimped around the jacket for a durable connection.

Once this connection is properly made, it is possible to remove the entire front or "stinger" end of the holder for service or replacement by simply unscrewing it from the connection nut while the cable strands stay tightly packed inside.

Model ST-3 takes electrodes through 1/4" at 300 amps; Model ST-5 through 3/8" at 500 amps.

Circle No. 44 on Reader Service Card.

Steel Lifting Clamps

A new line of lifting clamps featuring lightness of weight, compactness of size and a giant jaw opening has been announced by J. C. Renfroe & Sons, Inc.

Called the Bulldog, the new clamps come in 1/2-, 1-, 4-, and 7-ton sizes. They supplement the company's line of safety-lock steel lifting clamps.

Circle No. 155 on Reader Service Card.

Metal Spray Powder

A new easy-to-apply, tough, long-wearing metal spray powder designed for rebuliding worm engine and compressor crankshafts is now available from Wall Colmonoy Corporation. The new patented material is high in chromium and nickel and contains wear resistant chromium borides.

The new Colmonoy C-290 powder is spray applied. Finish grinding of the sprayed journal completes the procedure. The tough metal spray overlay produces longer crankshaft life.

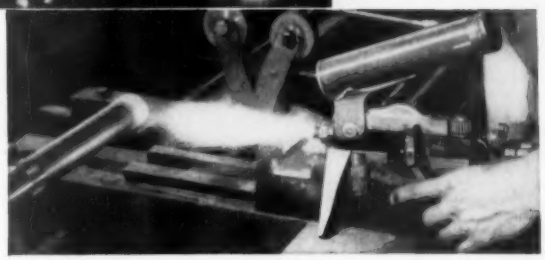
The new powder features a low coefficient of friction. Colomony C-290 also has excellent oil retention qualities.

Circle No. 156 on Reader Service Card.

Complete your shop with this modern metallizing installation

WIRE GUN
Sprays any metal that can be drawn into wire form.

POWDER GUN
Sprays hard-facing alloys and ceramics in powder form.



Without metallizing no maintenance or "job" shop can offer the same complete service as the shop that uses industry's low-cost "putting-on" tool.

With modern, low-cost metallizing equipment you can spray carbon steels, stainless, babbitts, brass, bronze, nickel, aluminum, tin, zinc, special hard facing alloys including tungsten carbide.

- **Save up to 90% of replacement costs on machine repair jobs**
- **Do your own hard-facing at high speed, low cost**
- **Apply long-wearing, corrosion-resistant coatings**

A real opportunity for the smaller shop

Thousands of large, well-known companies and shops have been metallizing users for many years, not only in maintenance work but in production applications on original equipment. Now, with modern low-cost metallizing equipment this high-speed "putting-on" tool is within the reach of even the smallest shop.

FREE BULLETIN

Send off the coupon for detailed information — find out how a metallizing installation can pay for itself in a very short time. No obligation, of course.

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1179 Prospect Ave., Westbury, L. I., New York

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METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

For More Information Circle No. 35 on Reader Service Card.

POWER...PRECISION
SPECIFY
DE-STA-CO
TOGGLE CLAMPS
FOR QUALITY, TOO!

De-Sta-Co "Tiny Toggles" are ¾" high, 2¾" long when closed. Many different bases. U and solid work-holding bars. Ideal for light gauge welded assemblies where space is at a premium.

International Conveyor built this fixture to produce over a hundred 18' wheeled conveyor fixtures on which automobile frames are assembled. The 7" H-beams are brought to bear properly during welding, even sprung to fit, by six De-Sta-Co Model 558 Clamps developing over 2500 lbs. pressure. The completed conveyor line assembly fixtures also employ De-Sta-Co Toggle Clamps.

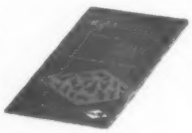
If your holding problems are at the opposite extreme, there's a group of "Tiny Toggles" only ¾" high but packing 42 lbs. of pressure. This is just an indication of the range you'll find in the De-Sta-Co line of over 130 models, types and sizes for every conceivable fast-action parts holding job. Welders predominantly specify our portable plier clamps. A broad selection of spindle accessories makes it easy to fit any clamp to your job. Along with this versatility, notice the quality features, such as plastic grips, cadmium plating, hardened bushings and serrated pivot pins, as you might expect of the originators of production speed-clamping devices.

Send for new catalog showing many clamp applications, dimension drawings and mechanical data. Ask for the name of the De-Sta-Co stocking distributor in your area.

Portable Clamps

Angular-Bar Type

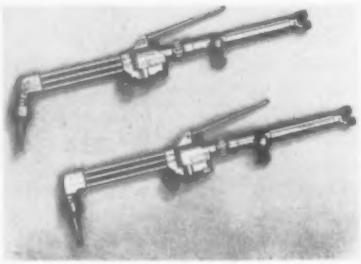
Air-Operated Type



De-Sta-Co is widely known for toggle clamps, stampings, precision washers, spacers, shims, shim and feeler stock, blower housings and marine specialties.

DE-STA-CO
Originators of Production Clamping
DETROIT STAMPING COMPANY
324 MIDLAND AVENUE • DETROIT 3, MICHIGAN

For More Information Circle No. 24 on Reader Service Card.



Slip-In Cutting Assembly

A new lightweight cutting assembly, which permits the use of "Slip-In" tips, has been developed by Smith Welding Equipment Corp. for its Airline torch.

Designed to be used with Smith's AW1 torch bodies, this Airline 300 assembly is made in two models—one with a 75° head, another with a 90° head. Both use "Slip-In" tips which eliminate the need for wrench tightening.

The head and butt of the new assembly are forged brass, precision machined. O-ring seals separate gases until they mix in tip. A check valve prevents flashbacks.

Circle No. 158 on Reader Service Card.

Vinyl-Jacketed Cable

The new HVF, high voltage-frequency, vinyl-jacketed welding cables announced by Belden Manufacturing Company are designed to provide complete resistance to corona and ozone cracking, and give long lasting dependable service.

Constructed of flexibly stranded electrolytically pure copper, the new cables are extremely limp and are said to have longer flex life. Cables are available in sizes 1 through 3/0 ond 250- and 500-foot spools.

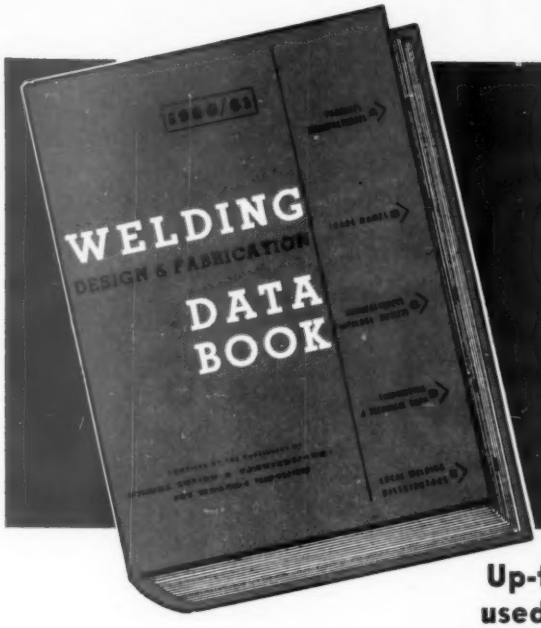
Circle No. 160 on Reader Service Card.

Silver Brazing Flux

Greater heat tolerance and outstanding coverage per pound are said to be features of a new general purpose silver brazing flux just introduced by Special Chemicals Corp. The manufacturer reports that Kwikflux 490 remains in solution and retains its strength when diluted with relatively large volumes of water.

Circle No. 161 on Reader Service Card.

NOW IN PREPARATION...
YOUR GUIDE TO BETTER WELDING



Over 800 pages of valuable welding information

Up-to-date and complete. The most widely used buyers' guide in the welding industry

The 1960/61 WELDING DATA BOOK has over 800 pages of facts for buyers between its handsome cloth covers. You'll find more than 350 products listed, along with 1700 trade names and 2000 welding supply distributors. Special features include a 300-page technical and engineering data section and a section of manufacturers' catalogs and sales outlets.

These five convenient sections are thumb-indexed for quick and easy reference:

Index To Manufacturers: An alphabetic listing of welding, cutting and brazing equipment and supplies, accessories and auxiliary equipment. Manufacturers and their adresses are listed under each product.

Trade Names: An alphabetic listing of product trade names, the products they identify and the names and addresses of the manufacturers.

Manufacturers' Catalogs And Sales Outlets: Catalogs and advertising give information on welding equipment and accessories. An index to catalogs and advertisements lists the manufacturer's name and address of main plant, telephone number, names of key sales executives and names and locations of American and Canadian sales outlets.

Technical And Engineering Data: Three-hundred page section of technical and engineering data is divided into eight sections: It includes complete information on techniques and processes for welding and fabricating all metals.

Where To Buy Locally: An alphabetic listing by state, city and company tells where to buy welding equipment and accessories locally.

WELDING DESIGN & FABRICATION DATA BOOK
812 HURON ROAD, CLEVELAND 15, OHIO

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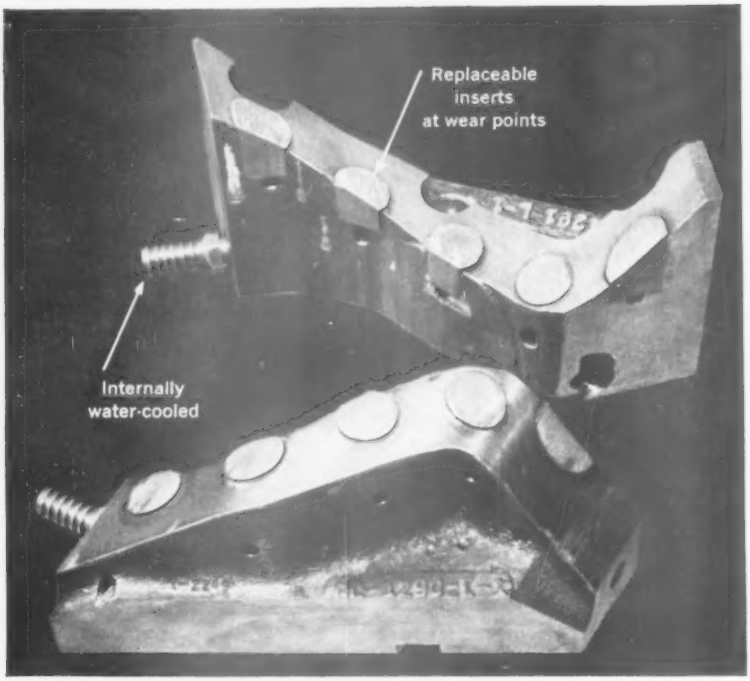
WELDING DESIGN & FABRICATION DATA BOOK

Collated by the publishers of Welding Design & Fabrication and Welding Illustrated

AMPCO®

7 times longer life for projection welding die!



Replacement time and cost reduced almost 75%!

Originally, the projection welding die shown here was cast to contour in one piece and not internally water-cooled. Its life was short. Replacement was expensive, in terms of both money and downtime.

Then Ampco's experience was drawn upon. Working surfaces were changed to incorporate relatively inexpensive refractory inserts which could be quickly replaced. Adequate water-cooling was provided, also. These two factors vastly increased die life.

Ampco has complete facilities and the know-how for making welding dies of all types — flash, butt, projection, and cross-wire. Your Ampco-Weld distributor can put them to work for you. Call him. Write for Bulletin RW-10.

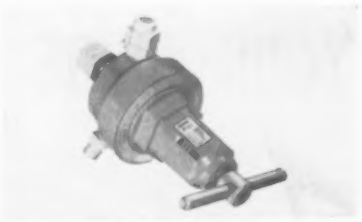
RESISTANCE WELDING ALLOY ASSOCIATION RWA

RW-28

AMPCO METAL, INC., Dept. 177-J, Milwaukee 46, Wis.

West Coast Plant: Burbank, California • Southwest Plant: Garland (Dallas County), Texas

For More Information Circle No. 8 on Reader Service Card.



Gaugeless Regulators

Linde Company, Division of Union Carbide Corp., has introduced a new line of regulators that can take rough handling without gauge damage. Reason? There are no gauges.

Designed for use with oxygen, acetylene or propane on cylinders or manifolds, the new large-capacity, single-stage regulators have stem-type valves and few exposed parts.

An indicator on the cap shows delivery pressures. Cylinder pressure is indicated on the regulator body.

Circle No. 163 on Reader Service Card.

Black Light Testing

Black light can be used effectively to detect solder flux, brazing flux, welding slag and other materials used in intricate electronic equipment, according to Black Light Corp. of America. The company found that a ray lamp (like their Model B-100 Blak-Ray) used in a curtained booth will find these fluorescent contaminants which show up bluish-white and yellowish.

Circle No. 164 on Reader Service Card.

Wide Range A-C Welder

Miller Electric Mfg. Co., Inc. has introduced a new M-295 welder that fills the gap between the very small and the very large welders. It is ideal for production, maintenance and repair shop needs.

Features include: moveable shunt current setting; two ranges (25 to 115 amps and 80 to 295 amps); high open circuit voltage; and forced draft cooling.

The M-295 is wired for either 230 of 460v service. It is available with power factor correction and special voltages.

Circle No. 165 on Reader Service Card.

New Seam Welders

An all new trim-line of standard seam welders is being introduced by The Federal Machine and Welder Company. These machines are available in three sizes ranging from 50 to 400 KVA inclusive. Each size is available as a circular, longitudinal or universal machine in a range of standard throat depths and transformer sizes.

The new line features a one piece trim-line frame. Welders take less floor space and gives greater working area.

Circle No. 166 on Reader Service Card.

New Safety Frame

Bausch & Lomb Optical Co. has added the new M-70 metal frame safety glass to its line of protective eyewear. It features a basic frame design and a selection of side shields that makes it quickly adaptable to different job requirements.

The M-70 has an expansion-type endpiece which allows easy assembly of both lenses (Bal-Safe) and side shields. One front and lens size can be combined with one of six shield types: wire mesh or insulated wire mesh and four other designs in acetate.

Circle No. 167 on Reader Service Card.

Resistance Welding Head

A new heavy-duty welding head for resistance welding intricate components is announced by Weldmatic, Division of Unitek Corporation. Advantage of the new welding head are: Electrode pressure (force) adjusts from 2 to 50 lbs., easy-working height adjustments, upper electrode arm gives follow-up, welding setups can be made for moderate to heavy applications.

Head measures 19½" x 4¼" x 13½", weighs 13-lbs, and has capacity of 500 watt-seconds.

Circle No. 168 on Reader Service Card.

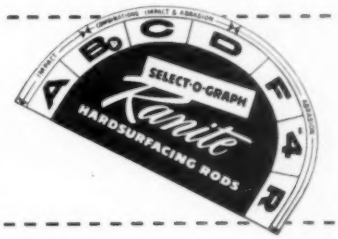
Ranite–The ORIGINAL Metallic-Coated Hardsurfacing Rod

is still easiest to select, easiest to use and offers the most advantages!

NO OTHER HARDSURFACING MATERIAL OFFERS ALL THESE ADVANTAGES:

- Equally good operation with AC and DC machines
- Readily applied in all positions
- Quiet, stable arc
- No Splatter loss
- No slag to remove
- Clear welding vision
- Economical because there is minimum of flux, maximum of material to enter weld
- Arc easily re-struck, if broken for any reason
- Very little tendency for deposit to check because rods alloyed with proper coefficient of expansion
- Firm bonding of deposit to base metal
- Ranite-coated surfaces can be torch-cut when necessary, thus reducing repair costs
- Rapid deposition rate cuts welding time
- High recovery rate assures more *deposited* metal per pound
- Broad latitude of Ranite rods gives weldors ample leeway in selection and use
- Correct rod selection is simple and easy–the big majority of all jobs are handled by just five Ranite rods–A, BX, C, D and No. 4

GET FREE Ranite Select-O-Graph Guide—shirt pocket size—shows best rod to meet any wear condition. Ask your Ranite distributor or write direct.



Originators and pioneers of metallic-coated rods—since 1938

Ranite
WELDORS' NO. 1 CHOICE FOR HARDSURFACING

RANKIN MANUFACTURING CO.
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Alhambra, Calif.

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CYLINDERS AND GAS PRODUCING EQUIPMENT
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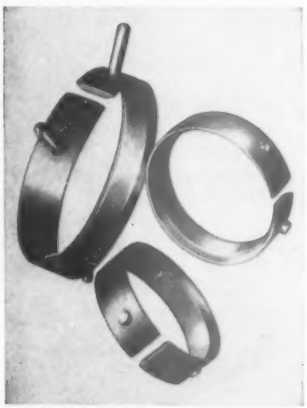
APPROVED BACKING RINGS



FOR WELDING PIPE, VALVES AND FITTING JOINTS

- Time-saving in fit up and handling.
- Consistent root penetration.
- Radiographic quality welds.

Available in Carbon Steel, Wrought Iron, Chrome Alloys, Stainless Steel and Aluminum.

Write for complete bulletin.

ROBVON BACKING RING CO.
675 GARDEN STREET • ELIZABETH, N. J.
Phone: Elizabeth 2-9613

Circle No. 62 on Reader Service Card.

Portable Nibblers

The Fenway Machine Co. produces five portable electric and pneumatic nibblers that can reduce metal cutting time 75%. Punch-and-die-action, capable of cutting 10 gauge stainless or 8 gauge mild without distortion, is said to assure a smooth cut with no chipping, binding, curling or flaking.

Nibblers can cut copper, aluminum and coated metals (with attachment) without clogging—at five feet per minute.

Circle No. 169 on Reader Service Card.

Tubular Surfacing Wires

A new line of wires for semi-automatic surfacing with the Hobart Manumatic or any semi-automatic welding unit has been announced by Hobart Brothers Co.

The 7/64" diameter wires, furnished in 12" ID, 50 lb. coils, can be deposited with either open arc or submerged arc processes using any welding machine having sufficient deposition and duty cycle capacity. Four HB wires offer a wide range of deposit hardnesses and physical characteristics.

Circle No. 170 on Reader Service Card.

Inert Arc Welders

The Magna-Tran series of inert arc welders introduced by Mid-States Welder Mfg. Co. include an electrically controlled current output system for use in either shielded inert gas welding or metallic arc welding. All models are equipped with extra high-power factor correction built in for lower line draw and more economical operation.

New design has eliminated the need for a separate saturable reactor since

the transformer is engineered with a built-in saturating shunt control system which governs the output current of the machine internally. Each welder is equipped with a three-position range switch to provide optimum amperage control for both light and heavy work. The low range provides current settings of 3 to 100 amperes, the medium range 30 to 250 amperes and the high range 125 to 410 amperes. The output in each of these ranges is regulated by a variable rheostat mounted on the front panel of the machine or by a foot operated rheostat located remotely from the unit.

High frequency control system provides wide versatility in operation by offering a choice of any combination four different plug-in type timing devices. The timers govern the post-flow of gas-water, the pre-flow of inert gas, the high frequency drop-out and inert spot welding.

Circle No. 171 on Reader Service Card.

Low Headroom Hoists

Robbins & Myers, Inc., Hoist & Crane Div., has introduced a line of Type F3 electric hoists available in capacities from 1½ through 7½ tons. They feature low headroom.

Circle No. 172 on Reader Service Card.

Small 350-Amp Holder

A new water-cooled manual tungsten-inert-gas holder has been marketed by Air Reduction Sales Co. The new Heliweld H35-B can weld paper-thin to over ⅛" thicknesses in metals like stainless, aluminum, copper and magnesium.

Features include: enclosed, minimum-leak cooling system; clear plastic hose assemblies equipped with nuts and glands for easy removal; and 500°F resisting plastic holder body. Holder is rated 350 amps on DCSP, 300 amps AC.

Holder has a minimum of 2⅞-inch interference dimension when using a 2-inch collet cap assembly and short nozzles.

Circle No. 173 on Reader Service Card.

For More Information Circle No. 4 on Reader Service Card.

BRIGHT FINISH
ALUMINUM
WELDING WIRE
• deposits uniformly
• eliminates interruptions
• makes x-ray quality welds
All-State Bright Wire Spoolarc, extruded and precision spooled, is uniformly round, microscopically clean... meets aviation, tankage, and shipbuilding standards.
Send for booklet and chart on all types and forms of aluminum in BRIGHT FINISH . . . including 1 lb. and 10 lb. spools. Stock maintained at St. Louis, South Gate, Calif., Toronto, Canada, and White Plains, N. Y.
Distributor-Stocked, convenient to buy. Economical to use.
ALL-STATE WELDING ALLOYS CO., INC., White Plains, N. Y.
Call WHite Plains 8-4646 or write for nearest distributor

MODERN, STRATEGIC DEFENSE PLANNING . . .
WELSH WELDERS' FLASH SPECTACLES!

Protects against impact, light or flash hazards where a completely enclosed, cup type, safety goggle is not required.

Lenses meet all Federal specifications . . . are made of heat treated glass.

Style 3261
Sturdy, precision-made, metal frame spectacles with solid plastic or leather side shields.

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Rugged, comfortable butyrate frame spectacles with solid or perforated side shields.

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W E L S H — Willingly Worn By Workers Everywhere

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YOU CAN KEEP 'EM DRY

FOR 14c A DAY

Moisture-proof your electrodes at low cost with

DryRod® OVEN

Fourteen cents worth of electricity per day — that's about all it takes to operate the popular, Type 300 DryRod electrode oven. At that rate, and its low purchase price, you can't afford to be without DryRod protection against moist mineral coated rods. Insure your electrode investment against:

- POROSITY • UNDER-BEAD CRACKING
- ROUGH WELDS • ROD SCRAP LOSS
- REJECTS • REWORKS
- PRODUCTION SLOWDOWN

NEW! 800° or 1000° HIGH TEMPERATURE Re-baking Oven now available

The DryRod line of ovens now includes four basic models to meet every welding requirement.

Write for new folder "DryRod as Standard Welding Equipment".

PHOENIX PRODUCTS COMPANY
4731 N. 27th St. • Milwaukee 9, Wis.
Circle No. 58 on Reader Service Card.

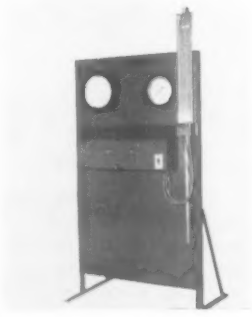
Welding And Flame Cutting Outfit

A new and attractively packed welding and flame cutting outfit introduced by National Welding Equipment Co. can be purchased without accessories, such as hose, goggles, spark lighters or with these accessory items, including either a 12½-foot or a 25-foot length of twin hose.

The outfit may be extended to include a variety of additional welding torch nozzles in various sizes and cutting tips for different applications and metal thickness. Multiple-flame heating and brazing nozzles may also be added.

The cutting attachment can cut metals by to 4-inches. An added attraction is the interchangeability of all of the nozzle types and sizes to also fit, with appropriate mixer, the company's larger welding torch model.

Circle No. 174 on Reader Service Card.



Burette Holder

Independent Engineering Co. has introduced a new, multiple burette holder for their Hydrostatic Gas

Tempilstik°

*temperature indicating crayons**

**Also Tempil° Pellets and Tempilaq° (liquid form)*

Tempilstik°—a simple and accurate means of determining preheating and stress relieving temperatures in welding operations. Widely used in all heat treating—as well as in hundreds of other heat-dependent processes in industry. Available in 80 different temperature ratings from 113°F to 2500°F . . . $2.00 each.

Send for free sample Tempil° Pellets. State temperature desired . . . Sorry, no sample Tempilstiks°

Most industrial and welding supply houses carry Tempilstiks° . . . if yours does not, write for information to:

SALES DEPARTMENT

Tempil° CORPORATION
132 West 22nd St., New York 11, N. Y.

Visit us at Booth 225—National Metal Exposition—Chicago—Nov. 2-6.
Circle No. 74 on Reader Service Card.

Cylinder Tester.

The newly designed unit carries three glass measuring burettes. It is specially designed for the user who has cylinders of various sizes to test. This new arrangement permits the operator to select the proper size burette for the cylinder to be tested.

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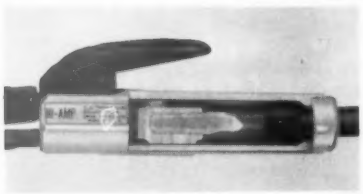


Threaded Connection

Threaded power connection (TPC) is the name given to a new development in connecting welding cable to accessories. It was developed by Lenco, Inc.

One end of a soft copper sleeve is threaded. Insulation is removed from the welding cable to allow the bare copper wire to extend about ½-inch through the sleeve and the sleeve is crimped onto the welding cable. The threaded sleeve is then screwed into a threaded socket on the accessory, pushing the bare end of the cable into the socket depth, making an excellent electrical connection.

Connection made to an electrode holder is shown above.

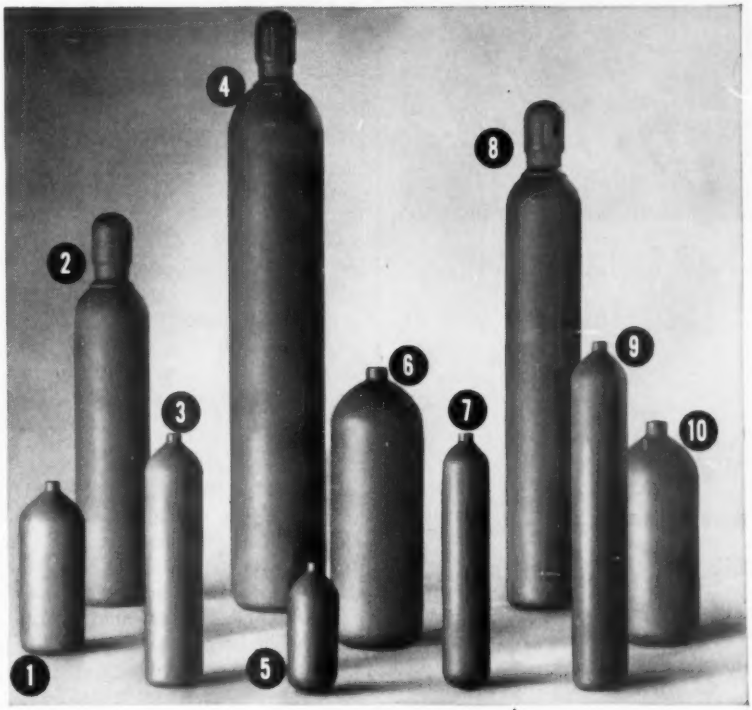
Circle No. 47 on Reader Service Card.

New Power Supply For Arc Spot Weld Gun

Bren Weld Corp. (formerly Brennen, Bucci & Weber, Inc.) has introduced the Bren Weld Model #100 power supply. The unit is designed for use with the company's arc spot welding gun. It insures automatic time control shut-off of the arc.

The unit weighs 40 lbs. and has an exclusive Transoidal transformer. The standard model operates on 110 volts on a 30 amp fuse and can be plugged in most any commerical outlet. The transformer winding is double-glass insulated, varnish-impregnated and baked. Other voltages are available on order.

Circle No. 176 on Reader Service Card.



Choose high-pressure gas cylinders from the HACKNEY "Family"

Shown here are ten popular Hackney high-pressure gas cylinders for industrial and medical services.

They are popular because they more than pay their way through long, maintenance-free service.

Lightweight, without sacrificing safety, strength or durability, Hackney deep drawn cylinders:

- save money on shipping costs
- reduce handling costs
- cut maintenance costs—smooth surfaces clean easily, paint quickly
- provide full capacity—no need for complaints
- require minimum storage space per cylinder
- earn customer good will—attractive appearance in doctors' offices, clinics, hospitals, etc.
- permit you to serve *all* customers with cylinders of the size they need
- exceed all ICC specifications

1. 5-lb. CO_2 5⅛" x 13⅞"
2. 80 cu. ft. oxygen 6⅛" x 32½"
3. "D" Medical 3⅝" x 16¾"
4. 250 cu. ft. oxygen 8⅝" x 51"
5. "A" Medical 3⅛" x 7⅝"
6. 20-lb. CO_2 7.45" x 23¼"
7. 11 cu. ft. oxygen 3⅜" x 18⅞"
8. 110 cu. ft. oxygen 6⅝" x 43"
9. "E" Medical 3⅝" x 25¾"
10. 10-lb. CO_2 6½" x 18⅝"

SEND FOR NEW BULLETIN. Gives complete facts about Hackney manufacturing features, range of capacities and sizes, ICC specifications, and other helpful information. Write:

Pressed Steel Tank Company

Manufacturer of Hackney Products

1473 South 66th Street, Milwaukee 14, Wisconsin

Branch offices in principal cities

CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

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WELD WITH Tipaloy

YOUR Resistance Welding Electrode NEEDS Are OUR Business!

Whether it be:
TIPS:
ROD or BAR:
SEAM WELDING WHEELS:
FORGINGS:
CASTINGS:
HOLDERS:
ADAPTERS:

SPECIAL WELDING DIES or FIXTURES: TIPALOY *has them.*

BUY TIPALOY and save money!

TIPALOY can supply you with:
RWMA Class #1, Tipaloy #100
RWMA Class #2, Tipaloy #130*
RWMA Class #3, Tipaloy #200
and other RWMA classes of alloys to fit your needs.

It is unwise to pay too much, but it is worse to pay too little!

Use TIPALOY and get 30% to 100% more performance for your money than you are now getting.

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Send your trial order today

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Circle No. 76 on Reader Service Card.

WELDING MANAGEMENT

watches these developments

ALUMINUM PARTS with precision welded zones of super-hardness and high wear-resistance are expected to find use in many automotive applications where localized hardness, wear- and heat-resistance are desired. Piston ring grooves, brake drums, valve seats and sheaves are major prospects for the zoned weldments. According to Alcoa Research Laboratories, four new aluminum welding alloys retain their hardness when applied to selected areas of aluminum castings and forgings.

According to Alcoa, one of the new alloys provides a Brinnell hardness of 250 at room temperature . . as hard as heat-resistant high-alloy steel. Comparable commercial aluminum pistons generally exhibit 110 Brinell hardness.

THE NEW, LONG-TERM (5-year) capital financing plan for manufacturers, announced last March by Commercial Discount Corp. of Chicago, has met with "an overwhelming response" from growth companies in the welding industry, Sidney Feuchtwanger, president announced. This financing, with a minimum of $100,000 and a maximum of $1,000,000 to any one firm, has resulted in long-term loans to four companies in the welding field, totaling $940,000.

A SCOTCH FIRM with welding and metalworking equipment large enough to make welded fabrications up to 50-tons is looking for work. R. Y. Pickering & Co., Ltd., Wishaw, Lanarkshire, Scotland, is interested in hearing from American firms interested in having their products manufactured in Scotland, either by a licensing arrangement or on a sub-contract basis.

DUCTILE TITANIUM can now be made in a newly developed electrolytic process which gives promise of making titanium metal less expensive to produce. The process was developed by a team of Norton Company research men after seven years of work. In addition to making titanium, the Norton electrolytic process is also designed to produce niobium, vanadium, chromium, zirconium.

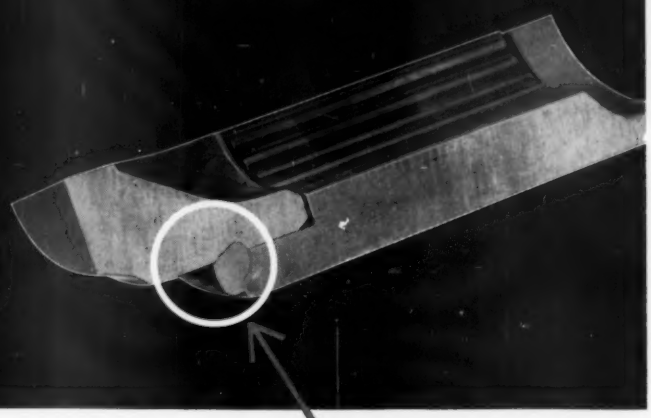
REDUCED PRICES for Climelt molybdenum products were announced recently by Climax Molybdenum Co. of Michigan, a subsidiary of American Metal Climax, Inc. Reuel E. Warriner, vice president of sales, stated these price reductions were the direct result of greater output plus the efficiency and effectiveness of a new, more efficient plant at Coldwater, Michigan.

The new price schedule is also the first official confirmation of the commercial availability of a molybdenum alloy with 30 percent tungsten. This material is designed mainly for ultra-high-temperature service under conditions where the metal's higher melting point can be used to advantage.

SALES CONTINUE TO INCREASE for members of the National Welding Supply Association. Comparative figures compiled by the Association revealed that sales for the 2nd Quarter of 1959 increased 20 percent over sales for the same period. In analyzing sales for the first six months of 1959 and 1958, the Association found that its members' sales were up 17 percent.

NEW WIRE

WELDS TWO HIGH-CARBON RESULFURIZED STEELS



Now You Can Weld SAE 1141 to SAE 1151----with CO_2 and

PAGE A-S-18

The cutaway portion of a drive shaft shown above was produced on an automotive production line. It consists of two welded pieces of high-carbon, sulfur-bearing steel—SAE 1141 and SAE 1151. Note the clean metal in the weld.

Previously, it has been impractical to weld these grades of steel by inert gas or submerged arc methods. Pre-heat and post-heat normally were required resulting in the annealing of the pre-hardened sections of the steel.

New PAGE Analysis A-S-18 solves this problem. Using PAGE A-S-18, without pre-heat and post-heat, you can obtain a high-quality, non-porous weld on any free-machining steels in the SAE 1100 series, or on any .25 to .50 carbon steel. For instance, .35 carbon steel joints welded with A-S-18, using CO_2, produced tensile strength of 75/81,000 p.s.i.—yield strength of 55/61,000 p.s.i.—elongation of 24%.

PAGE A-S-18 may be an answer to your welding problem. Why not try it?

A portion of a drive shaft shows perfect weld around circumference, a result of high elongation of PAGE A-S-18. The weld was accomplished in two passes.

Let PAGE Help Solve Your Welding Problems

These Folders can help you

Write for:

Folder DH-402-C
Contains information on submerged arc and inert gas automatic welding wire. Lists descriptions and uses of the many PAGE analyses. Describes our extensive variety of packaging. Illustrated.

Folder DH-1218 • Chart lists detailed analyses of PAGE automatic welding wires, metal spray wires, bare electrodes and gas welding rods. Shows uses and physical properties. Lists most competitive makes.

When you bring your welding problems to PAGE, you get the benefit of over half a century of wire drawing experience and leadership in metallurgical research. Leadership evidenced by the industry's widest range of analyses —33 grades designed to do an endless variety of welding jobs. Let PAGE help you improve your quality and lower your costs by furnishing the right wire for your job.

PAGE wire packaging is designed to give you the utmost in convenient storage and handling, whether you require a 1# spool or a 1200# payoff-pallet. Prompt delivery is assured from a coast-to-coast network of PAGE distributors backed up by strategically located PAGE warehouses.

You will find it is "good business" to bring your problems to PAGE.

ACCO

PAGE WELDING WIRE

Page Steel and Wire Division • American Chain & Cable Company, Inc.

Monessen, Pa.*, Atlanta, Chicago*, Denver*, Detroit, Houston*, Los Angeles*, New York, Philadelphia*, Portland, Ore., San Francisco*, Bridgeport, Conn.

*Indicates PAGE warehouse stocks

PAGE—THE SOURCE FOR ANSWERS TO WELDING PROBLEMS

For More Information Circle No. 57 on Reader Service Card.

For More Information Circle No. 71 on Reader Service Card.

SOLID

SEMI-AUTOMATIC WIRE

New MANGANAL®

11% - 13½% MANGANESE - NICKEL STEEL

SOLID SEMI-AUTOMATIC WIRE

1. Higher deposition rate. (12 lbs./hr. on high amperage)
2. Higher build-up.
3. Cannot kink and crush in feed rolls.
4. Practically no spatter.
5. 25 lb. coils, 7/64" diameter.

NEAREST DISTRIBUTOR UPON REQUEST

SEE YOUR MANGANAL® DISTRIBUTOR

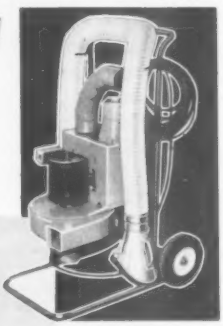
MEMBER ASSOCIATION

SOLE PRODUCERS STULZ-SICKLES CO.

929 JULIA ST. • ELIZABETH, N. J.

Now you can Weld Safely Anywhere!

New CAR-MON Portable Exhauster



Safeguards health, worker efficiency everywhere in the shop

COMPACT

Takes up only 5 sq. ft. in upright position.

New Car-Mon Portable Exhauster rids the air of gases, fumes, smoke. Rolls anywhere — lets you utilize the whole shop for welding, soldering or brazing operations. Saves valuable time, money, and effort. Up to 24 feet of tubing can be attached to fan discharge to expel fumes away from operator or out of the building.

WRITE FOR CATALOG

CAR-MON PRODUCTS, Inc. 1541 W. Devon Ave. Chicago 26, Ill.

For More Information Circle No. 20 on Reader Service Card.

LIBRARY

of welding

METALLIZING HANDBOOK

"Metallizing Handbook" by Metallizing Engineering Co., Westbury, L. I., New York; 320-pages, $5.00.

This comprehensive 320-page volume covers all phases of modern metal- and ceramic-spraying. It contains "how-to" information, including the latest developments in the spraying—in powder form—of high melting point ceramics, such as alumina and zirconia, and hard facing alloys, including tungsten carbide.

Resurfacing of worn machine parts, corrosion protective coatings and many specialized metallizing applications are covered.

Illustrated with over 150 diagrams, photos, charts and tables, this book shows preparation methods, spraying operations, effects of gas and spraying feed adjustments, distances. Cost estimating data is included.

AWS PUBLISHES TRAINING MANUAL FOR ARC WELDING

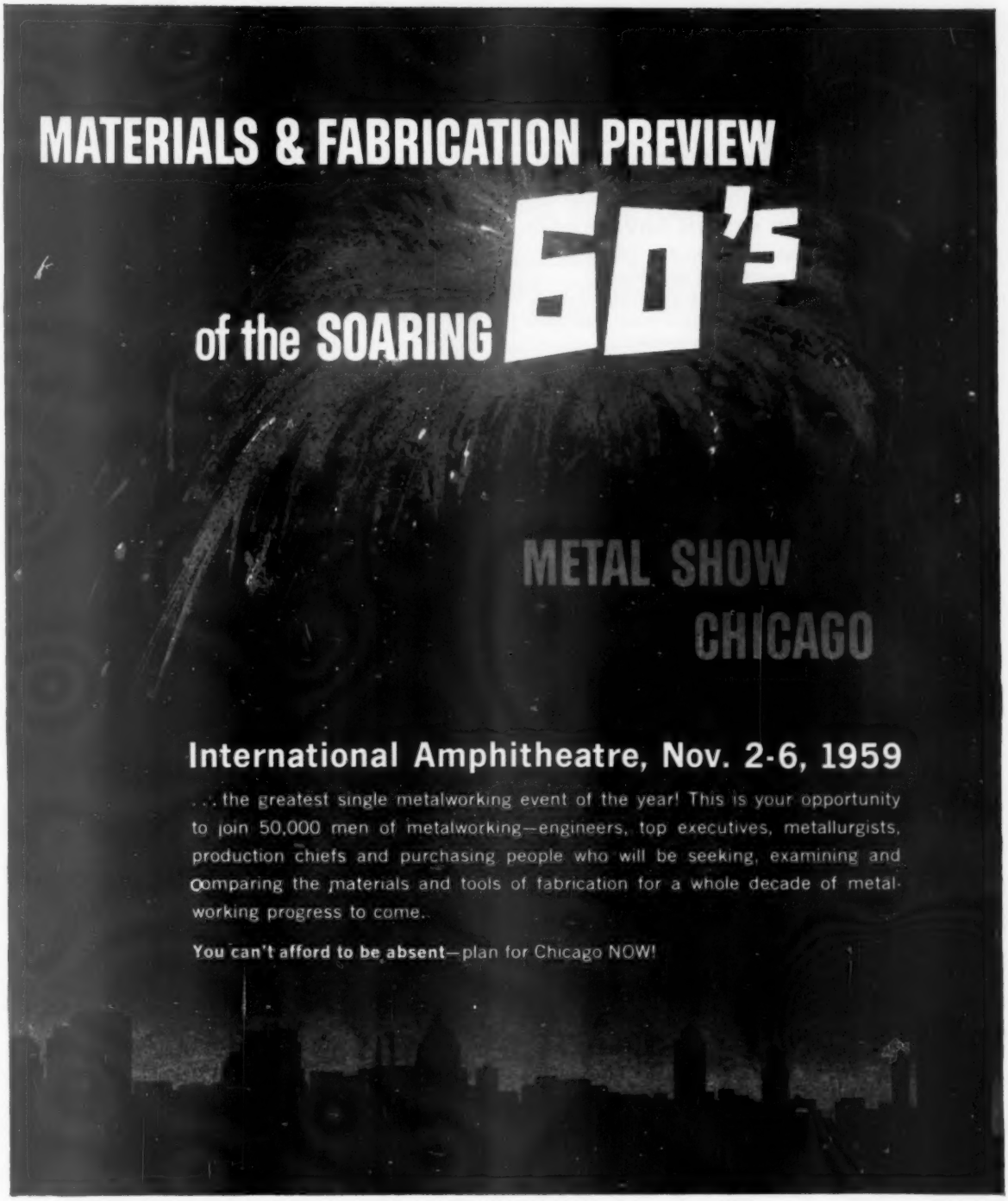
American Welding Society, 33 West 39th St., New York 18, New York; list price $3.00, postpaid.

The publication of an Arc Welding Training Manual specifically designed for welding operators and instructors of manual metal arc welding has been announced by the American Welding Society.

Contents include welding processes and recommended safety practices, the metal-arc process, accessories, exercises in arc welding, arc welding equipment, identification of metals, and metals and their structure. Profusely illustrated, the manual contains 337 line drawings, halftones and tables.

The material was prepared in response to requests from schools and industry for a training manual of basic arc welding information which would be a guide to instructors and a reference to welders. Fifty pages are devoted to arc welding exercises and the various techniques can be mastered by following the instructions.

continued on page 70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International Amphitheatre, Nov. 2-6, 1959
. . . the greatest single metalworking event of the year! This is your opportunity to join 50,000 men of metalworking—engineers, top executives, metallurgists, production chiefs and purchasing people who will be seeking, examining and comparing the materials and tools of fabrication for a whole decade of metalworking progress to come.
You can't afford to be absent—plan for Chicago NOW!

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Cooperating Activities: The Metallurgical Society of AIME; Society for Non-destructive Testing, Inc. Associations presenting technical sessions in cooperation with ASM: Metal Powder Industries Federation; Metal Treating Institute; Ultrasonic Manufacturers' Association;

Special Libraries Association—Metals Division; American Society for Testing Materials—Committee B-9; and the extensive programs of the American Society for Metals with the William Park Woodside Memorial Sessions, and ASM Metallurgical Seminar.

For More Information Circle No. 32 on Reader Service Card.

Flood FIBER GLASS WELDING HELMETS
For Safety, Comfort and Economy

These seamless fiber glass units (of thermo-setting, polyester resin) are compression-molded and sturdily reinforced to afford maximum protection. All are fitted with the new Fit-Rite, snap on, ratchet type headgear—the most comfortable, durable and easiest-to-maintain you can buy, and not more expensive.

NEW DESIGN ADVANTAGES

1. Lighter weight for more comfort.
2. A smoother and stronger shell.
3. Easier cleaning and sterilizing.
4. Non-warping moisture-proof construction.
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1000-HOUR COVER LENS
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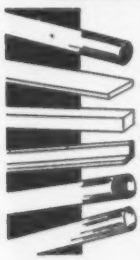
1 Man + 1 Bender + 147 Dies = ANY BEND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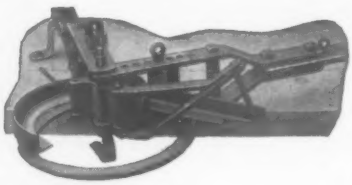
FLATS
SQUARES
ANGLE IRON
PIPE
TUBING & CONDUIT



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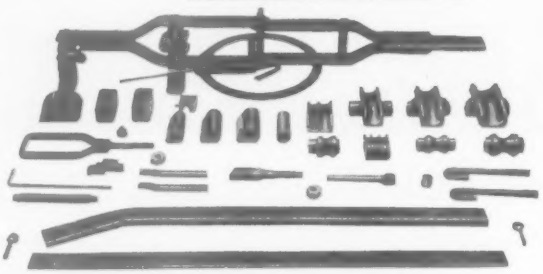
UNIVERSAL® IRON BENDER
35 Years Bending Experience

- Wrenchless, ready to use.
- Practical, quickly set up.
- Adaptable, replaces special equipment.
- Versatile, 147 different dies available.
- Dependable, a "must" for maintenance, limited production.
- Invaluable, optional equipment makes jobs easier.


BENDER SHOWN WITH REGULAR EQUIPMENT

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436 W. THIRD STREET • WINONA, MINNESOTA

For More Information Circle No. 41 on Reader Service Card.

continued from page 68

AIRCO ENGINEER WRITES TWO NEW WELDING TEXTS

Arthur N. Kugler, chief welding engineer, Air Reduction Sales Co., has completed two welding texts which will be used in the welding correspondence course offered by the International Correspondence Schools, Scranton, Pa.

The texts, called "*Fundamentals of Welding*" and "*Safety in Welding and Cutting*", are part of a projected 12 book series to be written by Mr. Kugler for this course. When completed they will cover gas welding and cutting, arc welding and brazing.

Mr. Kugler has written numerous articles on oxacetylene and arc welding and is the author of the Welding Sections of both the Mark's Mechanical Engineer's Handbook and the American Machinist's Handbook.

METAL REPAIRS

"*Arc Welding Manual*" *by Forney Arc Welders, Inc., Box* 563, *Fort Collins, Colorado;* 210-*pages;* $2.50.

A comprehensive course in the fundamentals of metal repair is presented in this 210-page illustrated manual available from Forney Arc Welders, Inc. Used by a number of high schools, colleges and universities as a training manual in vocational and agricultural courses, the 6 by 9-inch spiral-bound book gives detailed information on the use of a single piece of equipment as an arc welder, carbon arc torch, and soldering iron to provide a complete range of metal repairs with a minimum investment.

The 43 chapters are organized to present instructions, practical working tips, exercises that can be performed as self-teaching aids, and questions and answers. Chapters on arc welding include fundamental information; various types of welded joints; cutting scarfing and drilling techniques, and hints on welding various metals.

Information on the carbon arc torch includes data on both brazing and welding, plus suggestions for some unusual uses of the torch.

For More Information Circle No. 72 on Reader Service Card.

TISCO®
TIMANG®

MANGANESE-NICKEL STEEL
WELDING PRODUCTS

Timang Manganese Welding Rod fuses easily and does not weaken the parent metal. Weld has the same work hardenability and wear characteristics as Manganese Steel. Rods, Bars, Plates, Etc. are excellent for repairs and new installations.

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cut weld cleaning time by 85%

THROW AWAY YOUR COLD CHISEL AND WHISK OFF WELD SPATTER WITH A DRY RAG! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. $3.40 per gallon, f.o.b. Dayton.

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Money-Back Trial Offer. Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

Prevents Heat Treat Scale . . . up to 1500°F. Brush on, heat, brush off. All metals.

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For More Information Circle No. 68 on Reader Service Card.

Look — at these sheared tubular ends — clean, true contoured and close fitting with a minimum of burr and distortion . . . ***You can make them fast,*** some up to

2000 an hour with Vogel patented tools. Or, if you prefer, we can do your notching, shaping, shearing and perforating . . . Either way

You save on cost!

ARC-FIT® notches up to 720 per hour.

ARC-SNUG prepares pipe ends for snug brazing—up to 500 pieces per hour.

ARC-TWIN® double notches pipe up to 750 pieces per hour.

CUT-OFF shears tubing in two up to 2000 per hour.

Samples of shearing and notching (also estimates) gladly furnished without obligation.

VOGEL TOOL & DIE CORPORATION

1819 N. 32nd Ave., Stone Park, Ill.

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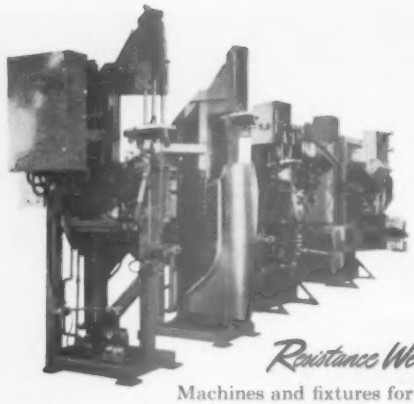
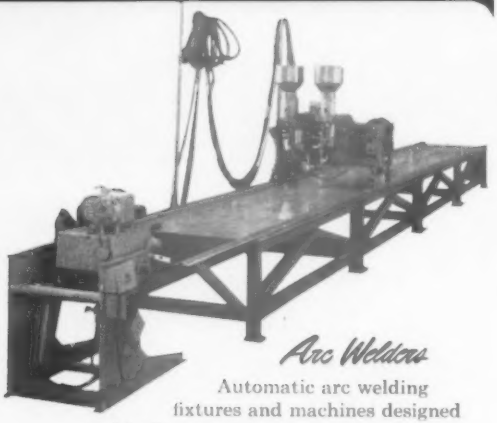


Resistance Welders

Machines and fixtures for your requirements from single spot to automatic, multiple operation production lines.

GOODRICH *Welders*

EFFICIENT LOW-COST PRODUCTION

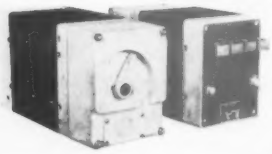


Arc Welders

Automatic arc welding fixtures and machines designed and built to match your part and production requirements.

Transformers

Standard fixture and Gun-Type resistance welding transformers from 10 to 500 KVA ratings; or to your specifications. 30,000 in operation.



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WELDING EQUIPMENT CORPORATION

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For More Information Circle No. 36 on Reader Service Card.

DESIGNING WELDED BRIDGES

continued from page 33

According to the specifications, it was permissable to field splice the girders if they proved too unwieldly for transport. However, the girders were moved without any particular difficulty over the 30 miles of curved highway between the fabricating plant and the bridge site on two trailing swivel dollies and a truck-tractor.

The top and bottom flanges are spliced with butt welds at four points in the top flange and six points in the lower flange of each 132-foot girder. The flange plates and web plates are connected by continuous fillet welds on both sides. These welds vary from 5/16- to 3/8 inches depending on the thickness of the steel. These welds were made with automatic submerged arc welders.

Stiffeners are fillet-welded to the underside of the top flange and to the web. However, at the lower ends, a filler plate, measuring 4 x ½ x 10-inches, is used between the flange and the stiffener to avoid having the welds perpendicular to the line of stress in the tension flange. The filler plate was first fillet-welded to the flange, then the stiffener was welded to the filler on each side.

Brackets on the outside of the fascia girders serve as stiffeners and support for the cantilever concrete sidewalks. The brackets and fascia of the concrete sidewalk are covered for the full length of the bridge by a ⅜-inch plate mainly for decorative purposes. The plate is welded to the ends of the brackets for support.

The eight-inch concrete deck and the steel girders were made into a composite unit by welding a six-inch spiral of ⅝-inch steel rod to the top flanges. This spiral developed the shear resistance necessary to have the slab and girder act together in resisting the compressive bending stress.

WELDED RAILROAD BRIDGE

The New York State Department of Public Works has also completed a welded railroad bridge—its first of this type. This bridge is a through-girder, single-track, grade-separation structure of two 80-foot spans designed for E-60 loading. Located on a new four-lane divided bypass of U.S. Route 20 around the village of Cherry Valley, N. Y., it carries a branch line of the Delaware & Hudson Railroad.

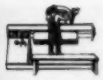
The main girders are spaced 16-feet 9-inches center-to-center, requiring floor beams of 21 WF 68 sections placed on three-foot centers, and are fabricated from 84 x ⅝-inch web plates and 20-inch wide flange plates varying in thickness from 1½- to 2½-inches. Longitudinal stiffeners of 6 x ½-inch plates are used on the exterior of the girders and intermediate vertical stiffeners of 7 x ½ inch plate on the interior face. End bearing stiffeners are 9- x ¾-inch plates. Double groove welds are used for web and flange splices.

The floor beams are connected to the girders by 3 x 3 x ⅜ inch angles. Although about two tons of steel could have been saved by the elimination of connection angles and by welding floor-beams directly to webs of the floorbeams, the detail was adopted to permit dismantling and re-erection of the bridge with a minimum of effort and cost.

continued on page 74

For More Information Circle No. 85 on Reader Service Card.

WEBB TANK PRODUCTION MACHINERY

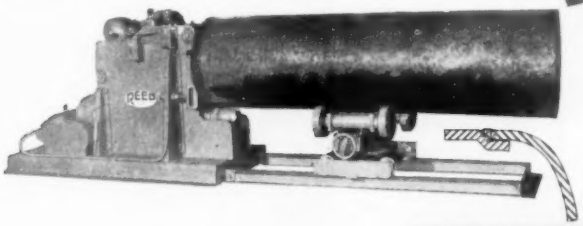

Horn Type Fixtures

Cylinder Flange Offsetters

Assembly Fixtures

REED OFFSETTER

This machine forms an offset flange around shell ends to facilitate automatic welding of tank heads. It eliminates chill rings, decreases fit-up time, improves the concentricity of shell ends, and aids in reducing actual welding time. Tight, clean joints result.



REED ASSEMBLY PRESS

Permits rapid fit-up of tank heads into tank shells where offset joggle joints are used. Hydraulic pressure is applied through ball-and-socket swivel joints that allow the head cups to set to the head. Hydraulically powered kick-outs speed up loading and unloading. Both headstock and tailstock are adjustable vertically.

FOR ILLUSTRATED LITERATURE WRITE DEPT. C.

Unit Type Turning Rolls

Portable Turning Rolls

Automatic Welding Track Supports

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REED EQUIPMENT DIVISION

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. . . if PRODUCTIVITY is what you want!

PRODUCTIVITY is what you get!

with the **VEE-ARC** 2 HP PORTABLE GRINDER

This **NEW** powerful but light-weight grinder does **MORE WORK** with less operator fatigue . . . **DESIGN-ENGINEERED** for use with **9"** disc wheels . . . can be plugged into nearest 120-v. AC power outlet . . . **LIFE-TIME LUBRICATED** . . . **TAMPER-PROOF SEALED** . . . **SIX MONTHS WARRANTY.** All this . . . and more for only **$168.00** f.o.b. nearest distributor.

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Screw flight faces receive a 1" wide overlay, using Colmonoy No. 1 electrodes.

Colmonoy Hard-Surfacing of Sand Conveyor Screws

Screw periphery is protected by ⅛" wide overlay of WCR-100 oxy-acetylene rod.

Cuts High Replacement Costs a Big 94 Per Cent

Using a combination of two Colmonoy hard-surfacing alloys, the operator of the foundry sand screw shown above now reclaims worn screws for less than half the cost of buying new ones—and they last *six* times as long. Overall costs are also lowered by reducing the number of overhauls, with less labor and down-time being required.

Spectacular savings such as these might well be made in your plant too. You know which equipment suffers excessive wear. Colmonoy sales engineers know what to do about it. Call one, or write to Detroit regarding your problem part.

Ask for Colmonoy Hard-Facing Manual No. 79.

HARD-SURFACING AND BRAZING ALLOYS

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DESIGNING WELDED BRIDGES

continued from page 72

The weight of this all-welded bridge was 265,000 pounds. An all riveted design would have weighed 305,000 pounds. This weight savings of 15 percent also represents a 15 percent saving in cost since the unit price quoted was the same for the riveted as well as welded design.

The new 236-mile Kansas Turnpike includes many welded bridges. A typical welded design on a continuous bridge uses a girder of uniform depth with a tapering flange. The necessary increase in section at the pier support is obtained by horizontal flaring of the flange.

The outside stiffeners on the webs of fascia girders are omitted in current practice in the interest of appearance and savings in the weight of steel. Transverse and diagonal bracing angles are now arc-welded to stiffeners in the field to tie the structure together. • •

BUTTERFLY VALVE DESIGN PROBLEM

continued from page 35

with good joint design and welding sequence. First we weld the smaller outside vee and fillet, then the inside vee (see table). Five passes are used on this joint.

After welding the flanges we weld the hubs in place then stress relieve the completed weldment. All butterfly valve bodies complying with the AWWA specifications are given a hydrostatic pressure test at double the actual pressure rating of the valve. • •

CO_2 WELDING

continued from page 36

the way. One button controls the complete welding cycle.

The operator now moves the air control lever. This releases the head stock plunger. The assembly is then lifted out by releasing the fast-acting clamp.

The first trial run produced 165 pieces per hour. In comparison of the before and after, the use of automatic welding is by far better from the standpoint of higher production and quality welds. CO_2 in this application gave the welds the smooth appearance required. • •

BRAZED VALVE JOINTS

continued from page 40

conveyor carries them past commercial gas-air burners. The burners heat the brazing alloy (flow temperature is 1145°F), making the joint. The assembled valves then drop onto another belt for inspection and finishing operations.

Our own engineers designed and built the assembly machinery. • •

For More Information Circle No. 64 on Reader Service Card.

SMS CORPORATION

Headquarters for Resistance Welding Supplies

R.W.M.A. Classes of alloys in castings, forgings and bar stock; copper tungsten alloys

Standard electrodes; special electrodes and fixtures designed and built

All types of straight and offset holders

Welder wheels in all alloys and sizes

Tip dressers, reamers and contour dressers

Adjust-A-Pressure holders (above, left) used with Adjust-A-Angle adapters solve many welding problems; change from one electrode spacing to another — a matter of minutes — with the same set-up.

S-M-S CORPORATION

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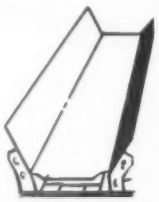
Wearalloy

LOW-COST HIGH ABRASION-RESISTANT

CARBON-MANGANESE STEEL



Wearalloy "A" . . . . . .

For High Abrasion-Resistance

HARDNESS: The surface hardness is 200 to 250 Brinell as-rolled.

PUNCHING AND SHEARING: Must be done with care; thickness up to ½-inch should be punched or sheared at temperature not lower than room temperature.

DRILLING AND MACHINING: Standard equipment can be used.

FORMING: Readily hot formed, but cold forming is not recommended.

WELDING: Use low hydrogen electrodes.

APPLICATIONS: Wear plates for drag buckets, conveyors, liners, chutes, hoppers.

STOCK PLATE SIZES: ¼-, ⅜-, ½- and ¾" by 48" by 144".

Wearalloy "B" . . . . . .

HARDNESS: Heat treated to 350-400 Brinell for shock- and wear-resistance.

FORMING: Can be cold formed.

WELDING: Use low hydrogen electrodes.

APPLICATIONS: Ore chutes, quarry dump truck bottom liner plates, rock crusher liners, wear liners, concrete block machines, concrete pipe core liners.

STOCK PLATE SIZES: ¼-, ⅜-, ½-, ⅝-, ¾- and 1" by 48" by 144". BARS: ¾" by 4", ¾" by 6", 1" by 5". Mill lengths: 18-20 feet.

FORD Steel Company | 5051 PATTISON ST. LOUIS, MISSOURI Phone PRospect 2-1919

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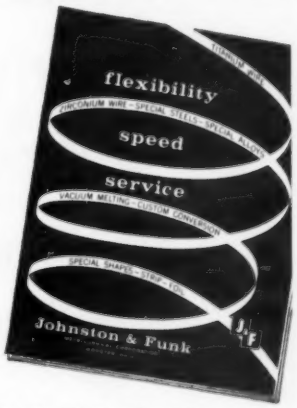

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Need highly critical special steels and alloys?
Need outside brainpower and special facilities?

Here are the straightforward facts on a pioneer in special metal conversion . . . how J&F can provide you with topflight help, fast delivery, competitive prices on ingots, billets, small diameter bars, wire, rod, narrow strip, foil and tailor-mades . . . how J&F's highly experienced staff works from the initial melt, producing metals of certified quality for military and commercial needs, R & D or production quantities.

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METALLURGICAL CORPORATION
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A subsidiary of Malloy-Sharon Metals Corporation

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REFERENCE DATA

catalogs, handbooks, manuals

THE COMPLETE LINE of arc welding cable connections and accessories manufactured by Tweco Products, Inc. is featured in new Tweco Catalog No. 12. It includes specifications, availability and prices.

Circle No. 100 on Reader Service Card.

NEW SAFETY PRODUCTS catalog for industrial and laboratory job requirements is available from Safety Products Division of Bausch & Lomb. It includes "in use" photos, an indexed price list and descriptions and specifications of Bal-Safe lenses and new Enduron plastic lenses.

Circle No. 101 on Reader Service Card.

A NEW SHAPE CUTTING machine is described and fully illustrated in an 8-page booklet available from Linde Co.—Div. of Union Carbide Corp. It explains how metal parts can be reproduced from exact size drawings using the company's Oxweld CM-60 unit. Machine is said to be so advanced that all cutting operations are instantly and accurately controlled from an easy-to-use control panel by one operator.

Circle No. 102 on Reader Service Card.

RESISTANCE WELDING supplies made by the S-M-S Corporation are featured in a catalog. Featured are a wide range of alloys available as castings, forgings and bar stock. Welder wheels, straight and offset holders, standard holders and specials are featured along with tip dressers, reamers and contour dressers.

Circle No. 64 on Reader Service Card.

TWO NEW PRODUCTS of the Sight Feed Generator Co. are featured in a new bulletin. Described and illustrated are two new products that automatically put the flux in the flame when brazing all metals. Complete details are given for the equipment (Rexarc Twin Liquifluxers) and for the flux (Liquiflux).

Circle No. 103 on Reader Service Card.

BRONZE AND NICKEL SILVER ELECTRODES made by The American Brass Co. are featured in a bulletin offered by the company. Featured in the bulletin is free technical assistance to help you select the exact rod you need for your job. Ask for a copy of Publication B-13

Circle No. 6 on Reader Service Card.

"BUILT-IN GUARD" safety cup wheels for portable grinding are the subject of a new Carborundum Co. two-color folder. Included are advanced features, specifications and how-to-order information.

Circle No. 104 on Reader Service Card.

HI-AMP

ELECTRODE HOLDERS

CABLE ATTACHMENTS

GROUND CLAMPS

Offers

T.P.C.*

* THREADED POWER CONNECTION

Excessive heat in a welding circuit is oftentimes caused by a resistance build-up at some point in the welding circuit due to connections being loose or oxidization setting up in a mechanical type of terminal connection.

Shown in the above "cut-a-way" picture of an Electrode Holder is the new HI-AMP, T.P.C. type of connection that can be adapted to ground clamps and quick disconnect plugs as well as to electrode holders.

T.P.C. means a Threaded Power connection using the pressure of threads on a sleeve to drive the ends of any welding cable down into the depth of a cable socket, then locked into place with threaded plugs. An excellent electrical connection as well as providing direct contact with the welding cable to the accessory so that maximum heat is conducted into the heat-absorbing cable.

ASK YOUR WELDING SUPPLY HOUSE FOR FURTHER INFORMATION

354 W. ADAMS ST. LENCO, INC. JACKSON, MO.

For More Information Circle No. 47 on Reader Service Card.

ABRASIVE PRODUCTS for the welding trade are the subject of a comprehensive, free catalog offered by Carborundum Company. Described and illustrated is a complete line of abrasive products: wheels, belts, discs and cloths.

Circle No. 21 on Reader Service Card.

A NEW ELECTRIC WALKIE stacker designed for narrow aisle operation is described in a bulletin now being distributed by Raymond Corporation. The truck has a one-ton capacity and operates on four 6-volt batteries connected in series to provide 24-volt power for fast operation. It has three speeds in both forward and reverse.

Circle No. 185 on Reader Service Card.

A COMPLETE PRICE LIST for standard equipment and accessories for all wet blasting units made by the Pressure Blast Mfg. Co., Inc. is available. Included are costs of six stainless steel models. Itemized rates for standard, manually-operated and high-velocity units and automatic attachments are outlined.

Circle No. 186 on Reader Service Card.

NEW dished-depressed center wheels made by American Emery Wheel Works are the subject of a 4-page, two-color bulletin that describes the wheel and its use with portable grinders.

Circle No. 187 on Reader Service Card.

RESISTANCE SOLDERING and 10 types of soldering probes are the subject of a new catalog K-3 offered by Zephyr Mfg. Co., Inc. The catalog describes and illustrates three new Soldering units; the automatic, the heavy-duty and the light-duty.

Circle No. 188 on Reader Service Card.

LIQUID CONCEPT in atmospheric gas handling is the subject of a new bulletin just released by Cambridge Corporation, subsidiary of Carrier Corporation. A bulletin describes the company's Liqua-Guard system as a modern, efficient, and economical method for storing, handling and distributing atmospheric gases. The bulletin presents the advantages of liquid handling.

Circle No. 189 on Reader Service Card.

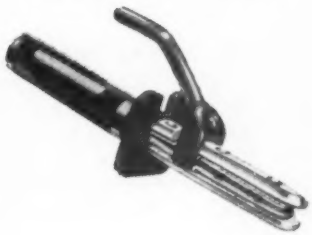
"DURO is the coolest"*

*says Ben Ruff of Reed & Graham, Inc. "Before I had to change holders whenever the one I was using would get hot. Now, with DURO, I can weld a whole shift without the holder getting hot to my hand, even when using 5/16 in. hardfacing electrodes at high amperages."

DURO will do the same for YOU

Proved by 27 years of weldor's preference

The DURO "Standard"



- All parts quickly replaced with a screwdriver
- Screw-in type jaws—no tools required
- Insulated handle and guard—protects the operator
- Rugged fibre handle—lasts longer
- Cool operation—cool handling

Featuring "Long Jaw Design" for reaching those "hard to get at places."

The DURO "DUROGON" Tong-Type

- All parts quickly replaced with a screwdriver
- Fully insulated—greater safety
- Cool operation—cool handling
- DUROGON-N3—Aluminum body—extremely lightweight; less operator fatigue; mechanical cable connection
- DUROGON-N3HD—Bronze body—heavy duty operation; mechanical, soldered or brazed connection.
- "The BEST of this popular design"

DURO

ENGINEERING COMPANY • 31 OREGON AVENUE HAMDEN, CONN.

For More Information Circle No. 25 on Reader Service Card.

Your "LINDE" Distributor WANTS TO HELP YOU... TO DO A BETTER JOB!

Your success is his success. As your business improves, his business with you increases. As your confidence in him grows, it benefits you both.

Your local LINDE Distributor offers a complete line of industrial gases, equipment, and supplies. He can satisfy almost any welding or cutting need *from stock.*

Difficult welding or cutting problems? See your LINDE Distributor. His technical background and experience, backed by Linde Company resources, can help get you on the right track quickly.

Talk with your LINDE Distributor today. As an independent local businessman, he is vitally concerned with your success. If you can't find his name in your telephone directory, write for it. Dept. 310, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd St., New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited, Toronto.

Linde

UNION CARBIDE

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Circle No. 48 on Reader Service Card.

NEW "PIPE-MATE" LIGHT WALL STAINLESS STEEL fittings and flanges for non-critical process piping are described and illustrated in a 6-page bulletin available from Tube Turns Division of Chemetron Corp. Bulletin includes methods of joining fittings and pipe, photos on rolled-in flanged assemblies, and charts giving dimensions, design properties, and dimensional tolerances of 5S and 10S pipe. **For More Information Circle No. 105 on Reader Service Card.**

NEW TIG WELDERS are the subject of a bulletin offered by the Lincoln Electric Co. The new bulletin describes operating features, construction details and application for the new Idealarc line of welding machines. The new machines are said to be the only units which can be used for all manual arc welding applications: DC manual electrode, AC manual electrode, DC inert gas, AC inert gas. **For More Information Circle No. 106 on Reader Service Card.**

VICTORY OVER STRESS-CORROSION CRACKING with a new aluminum bronze alloy—Ampco Metal Grade 8—is described and illustrated in a new 4-page bulletin published by Ampco Metal, Inc. Welding characteristics, forming, drawing and machining procedures, and physical properties of new alloy are explained. Applications in chemical, petroleum and paper industries and effective uses in marine and generating industries are described. **For More Information Circle No. 107 on Reader Service Card.**

"AIRCOMATIC AND HELIWELDING OF ALUMINUM" is the title of a 120-page comprehensive survey of aluminum welding techniques using two Air Reduction Sales Company's processes. Book covers aluminum's weldability, proper process selection for application, equipment descriptions, welding power supplies and safety practices. It contains illustrations, charts and detailed diagrams. **For More Information Circle No. 108 on Reader Service Card.**

COMPLETE LINE OF HEATING TORCHES which use oxygen with propane, natural gas, city gas and acetylene are featured in a 4-page booklet from K-G Equipment Co., Inc. Literature covers advantages and applications for the portable equipment. Pressure volume chart is included. **For More Information Circle No. 109 on Reader Service Card.**

COATED ABRASIVE DISCS made of "Magnacoat" are described in data sheets available from Abrasive Company of America. Illustrates in detail the use of coated abrasive discs on standard, general industrial sheet metal, soft or semi-soft metals, ceramics, glass, wood, and other special applications. **For More Information Circle No. 110 on Reader Service Card.**

"PORTABILITY DE LUXE" is the way Erico Products, Inc. describes their new "One-Shot" ground rod connection. New literature tells how the 2-inch package containing all materials necessary for making highly conductive (electrically), never corroding-or loosening-connections with the fast, high-portable Cadweld process is a time- and money-saver. **For More Information Circle No. 111 on Reader Service Card.**

CONDENSED PUNCH PRESS CATALOG featuring twenty-two floor model presses and six bench models, including the new Rousselle Econo-Air Friction Clutch and Brake, is available from Service Machine Co. Also included, are press specifications and a table of punching and shearing data. **For More Information Circle No. 112 on Reader Service Card.**

AXLES, COUPLERS AND TRAILER JACKS are the subject of a catalog available from Hammer Blow Tool Co., The catalog describes and illustrates a complete line of axle assemblies, trailer undercarriages, farm and trailer jacks, implement and trailer couplers and spindle and assemblies. You get full details for each particular application.

Circle No. 37 on Reader Service Card.

METALLIC-COATED HARD SURFacing rods are the subject of literature available from Rankin Manufacturing Co. The economics of the use of Ranite types A, BX, C, D and No. 4 to hold inventory down, get longer wearing parts and faster deposit rates are explained along with many other features.

Circle No. 60 on Reader Service Card.

NEW ARC welder controller is featured in data sheet from Mor Welder Controller Co. Described and illustrated is an easy-to-attach electrical device which gives operator remote control of most gasoline driven-, motor generator- and rectifier-type welders. A single button on the electrode holder lets the operator start, stop and regulate heat from his welding position while welding is being done.

Circle No. 113 on Reader Service Card.

ARC WELDING MACHINES are described and illustrated in a new 24-page, two-color catalog available from Hobart Bros. Co. The new catalog includes complete specifications and ordering information on their welders and automatic equipment. The catalog also describes a line of induction heating equipment, pipe thawing equipment and a power source for cutting and gouging.

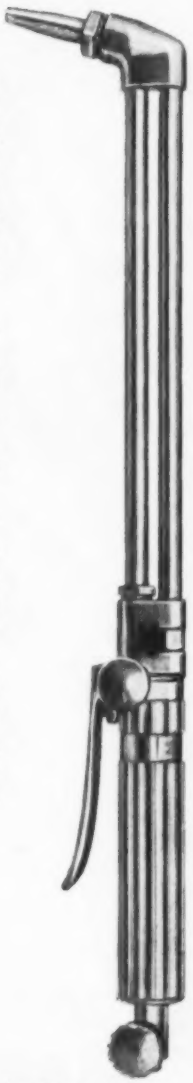
Circle No. 114 on Reader Service Card.

BRAZING STOP-OFF is the subject of a new engineering data sheet (No. 2.2.7) now available from Stainless Processing Division, Wall Colmonoy Corporation. The data sheet describes Nicrobraze Red Stop-Off, covering the product's uses and properties. Application recommendations and instructions are given.

Circle No. 115 on Reader Service Card.

VALUE VERSATILITY

···you get more of both in the PUROX TRADE MARK "E" Cutting Torch



When LINDE first offered the PUROX "E" Torch to industry, Ford's model T automobile sold for less than $500. Today's average car costs at least 350% more. *But the price of the "E" torch has gone up only 22%.* Since practically every part in it has been refined for improved performance and longer life, the PUROX "E"—granddaddy of cutting torches—is still one of the biggest oxy-acetylene apparatus values to be found anywhere.

Whatever your present requirements, there's a PUROX "E" Torch to take care of them. Choose a head angle of 75, 90, or 180 degrees in standard 20½-in. length, or a 36-in. model with 90-deg. head. Should new or special needs develop at any time, any model can be adapted to meet them by simply replacing the front-end assembly.

With four interchangeable front ends and 57 different nozzles, the PUROX "E" Torch easily handles any practical hand-cutting job. It cuts steel up to 12 in. thick, washes pads, cuts rivets, gouges, and pierces. *And it performs efficiently on acetylene or any other commercial fuel gas available.*

See the PUROX "E" Torch today at your LINDE Distributor's. Or write for free folder, F-1313. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited, Toronto.

Linde Trade Mark

UNION CARBIDE

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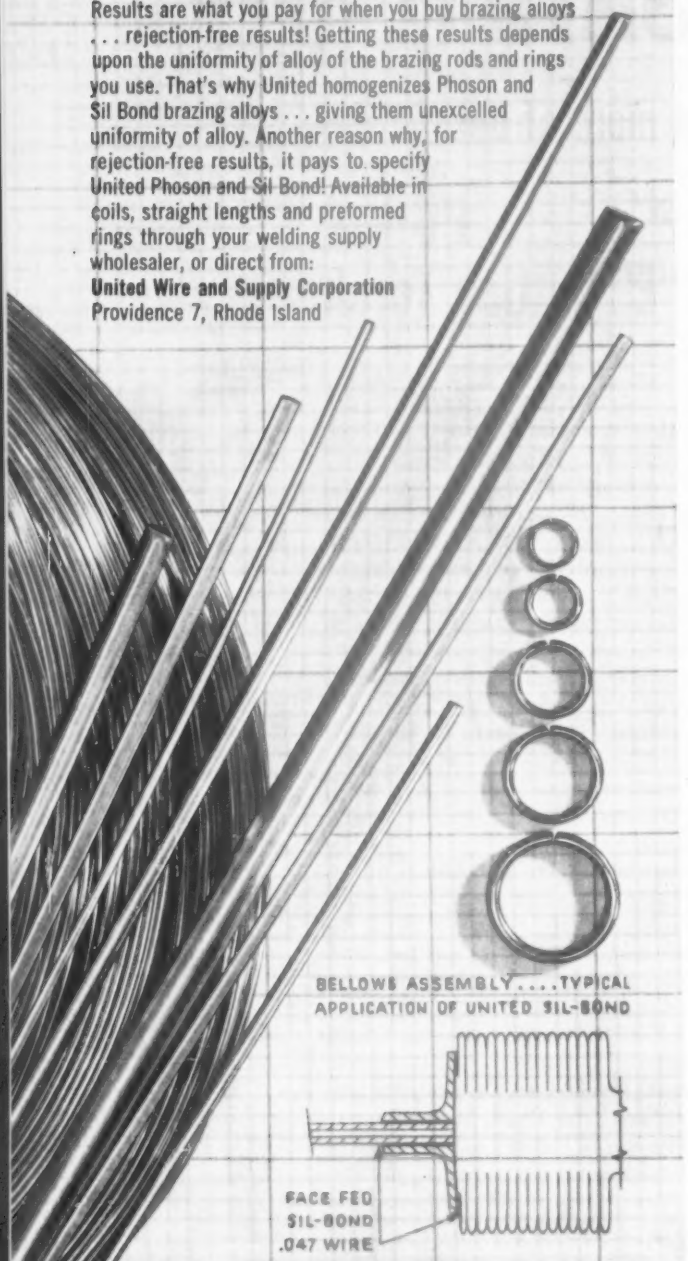
For More Information Circle No. 49 on Reader Service Card.

UNIFORMITY

Reason why—it Pays to Specify
Phoson and **Sil Bond** Brazing Alloys

Results are what you pay for when you buy brazing alloys . . . rejection-free results! Getting these results depends upon the uniformity of alloy of the brazing rods and rings you use. That's why United homogenizes Phoson and Sil Bond brazing alloys . . . giving them unexcelled uniformity of alloy. Another reason why, for rejection-free results, it pays to specify United Phoson and Sil Bond! Available in coils, straight lengths and preformed rings through your welding supply wholesaler, or direct from:
United Wire and Supply Corporation
Providence 7, Rhode Island



For silver brazing alloys . . . For aluminum, brass and copper wire and tube . . . always Specify

UNITED

USEFUL LITERATURE *continued*

ULTRASONIC TEST UNIT (Model PT1001) for non-destructive immersion testing is fully described and illustrated in a 6-page brochure from Curtiss Wright Corp., Industrial and Scientific Products Division. Booklet covers test unit's technical features and versatility of operation.

Circle No. 116 on Reader Service Card.

WHAT THE WELL DRESSED (safe) welding man will wear is shown in a folder from Aljay describing garments made from chrome tanned split cowhide. Literature describes overalls, pants, cape and bib, chaps, beanies, coats, capes and curtains —all cut roomy and riveted and snap-fastened for strength and closure.

Circle No. 117 on Reader Service Card.

WELDING EQUIPMENT COOLERS that can be used to cool arc, resistance and induction welding equipment are featured in a booklet from Bernard Welding Equipment Co. Described in detail is the company's 400 Series. Optional equipment and accessories are explained.

Circle No. 118 on Reader Service Card.

WELDING AND CUTTING EQUIPMENT, accessories and supplies are fully described and illustrated in a 27-page catalog prepared by Weldit Inc. Featured are complete welding and cutting outfits, Weldit thumb lever and lock lever controls and automatic Gasaver, and many models of welding brazing and cutting torches. Welding, hand cutting, and machine cutting tables are included showing material thicknesses, tip sizes, oxygen and acetylene consumption, and speeds.

Circle No. 119 on Reader Service Card.

LARGE CAPACITY INDUCTION HEATERS and control instruments for preheating before welding and stress relieveing after welding are covered in literature available from Electric Arc, Inc. Full descriptions of uses, specifications and flexibility of equipment are given.

Circle No. 120 on Reader Service Card.

INTERESTED IN A PLANT DEMONSTRATION of a versatile metalworking machine? Full details are given in a brochure from American Pullmax Company, Inc. Featured in the brochure is the company's complete line of sheet and plate working machines which can be used for cutting, beading, joggling, dishing, edge bending and louvering.

Circle No. 121 on Reader Service Card.

SPECIALIZED WELDING MANUAL, "A Manual for Maintenance and Damage Repair of Aluminum Tank Trailers," has been prepared by Alumi-

←For More Informtiaon Circle No. 79 on Reader Service Card.

num Company of America in cooperation with several tank manufacturers. Minor and major repairs and modifications are covered; joints, gases, alloys, techniques, and welding electrodes, are included. Eight tables show diagrams and dimensions; 30 illustrations show preparation and welding sequences.

Circle No. 122 on Reader Service Card.

A GUIDE TO THE PROPER machine for spot welding is available from Thomson Electric Welder Co. Handy data sheet tells what size and type spot welder to use on what materials to meet which specifications. Welder control groups are recommended.

Circle No. 123 on Reader Service Card.

A COMPLETE CATALOG from K-G Equipment Co., Inc., features a complete line of regulators, flowmeters, adaptors and needle valves. Each is illustrated and described in detail. Specifications are given.

Circle No. 124 on Reader Service Card.

ABRASIVE SNAGGING WHEELS for portable grinders are the subject of Catalog Bulletin ESA-304 issued by Simonds Abrasive Company. Popular sizes, shapes and standard grain and grade specifications are given for straight wheels, cup wheels and abrasive cones.

Circle No. 125 on Reader Service Card.

A NEW LINE OF WELDERS for AC and AC/DC inert arc welding are featured in a four-page brochure issued by Mid-States Welder Mfg Co. Eight advantages of the company's new Magna-Tran line are spotlighted. How each contributes to better welding is explained. A simple control system that features plug-in timers is described and specifications given.

Circle No. 126 on Reader Service Card.

A COMPLETE LINE of various clinch, pilot and weld nuts in standard and special types are described in a new 16-page, illustrated catalog now available from McLaughlin Co. Specifications and applications and ready-reference tables on recommended nut torque and pertinent screw thread information are given.

Circle No. 127 on Reader Service Card.

X-RAY PHOTOGRAPHY in the construction of pipelines is the subject of a new booklet published by Gevaert Company of America, Inc. The booklet contains data on techniques of circular assembly joints, inspection of welded joints, and a data table on the use of Structurix Industrial X-ray films.

Circle No. 128 on Reader Service Card.

FACTS AT YOUR FINGERTIPS: *If you want copies of the catalogs featured on these pages, just circle appropriate numbers on the bound-in Reader Service Card. We'll do the rest.*

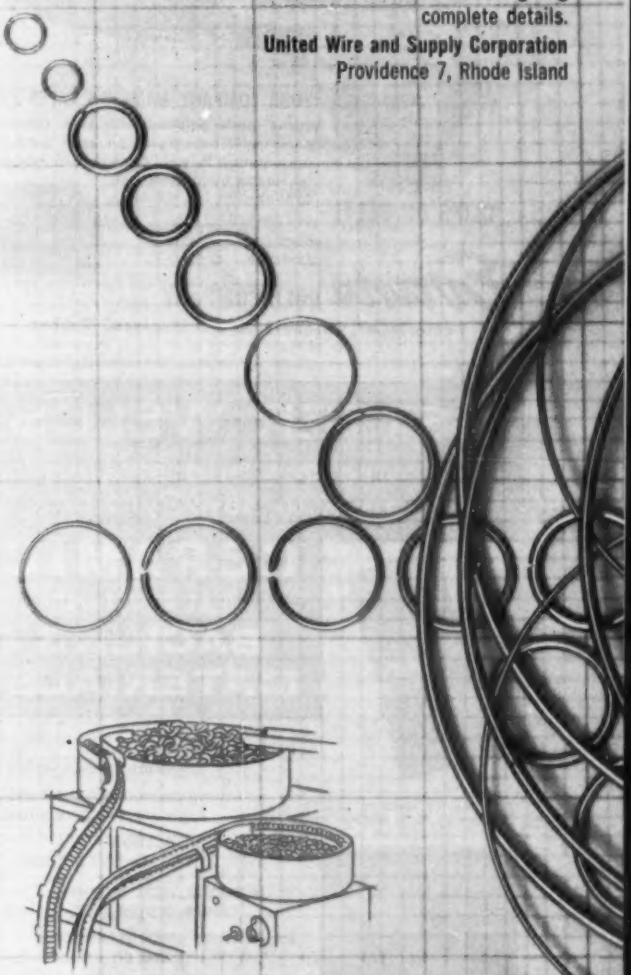
For More Information Circle No. 80 on Reader Service Card.→

AUTOMATION

Reason why it pays to Auto-Braze with **Phoson** and **Sil-Bond** Brazing Rings

Automated brazing has mushroomed into prominence as a profitable production technique for fast, dependable metal joining. And, it's easily adaptable to most manufacturing processes! United's precision brazing rings are manufactured for automation! Teamed with United's engineering know-how, Phoson & Sil-Bond alloys continue to boost the profit picture for many manufacturing concerns. If fastening costs are one of your problems, why not consult your United Brazing Product distributor . . . or write direct giving complete details.

United Wire and Supply Corporation
Providence 7, Rhode Island



TYPICAL AUTOBRAZING EXAMPLE...PRELOADING PHOSON RINGS ON COPPER U-BENDS

For aluminum, brass and copper wire and tube
For silver brazing alloys . . . always **Specify**

UNITED

For More Information Circle No. 29 on Reader Service Card.

EVANS WHITE TAPES
Sizes from 6 ft. to 12 ft.

NOW EACH IN
BELT HOLSTER

Now, Evans gives industry more big savings in measuring tapes!
Every Evans pocket tape, push-pull and power models, come packaged in a strong, metal-reinforced, vinyl-covered holster with belt clip. Makes measuring faster, tapes always handy.

CLIPS ON BELT!

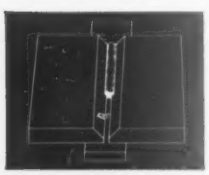
YOUR COMPANY NAME ON TAPES . . .
Evans tapes supplied with your company name and advertising on each tape for presentation to your customers. A wonderful way to build good will. Available in individual gift package.

Send for illustrated folder #5807.

Evans RULE COMPANY
Factories at; Elizabeth, N. J. & Montreal, Quebec

BETTER WELDS
on circular and straight seams with new Pyrotone
CERAMIC
HEAT RESISTANT
BACKING MATERIALS

Available for standard pipe sizes up to 24 inches



Easily removed when weld is completed

- Less skill required to produce better welds
- Heat engineered to withstand high arc temperatures
- Speed production—Lower fabrication costs
- Minimize weld failures—Insure proper root fusion
- Produce smooth, uniform bead on under side

Call or write today for illustrated bulletin on Pyrotone ceramic backing materials. Literature includes application data and full details.

General Ceramics Corporation
GENERAL CERAMICS
Industrial Ceramics for Industrial Progress... Since 1906
KEASBEY
NEW JERSEY
Telephone:
VAlley 6-5100

For More Information Circle No. 34 on Reader Service Card.

MOUNTED WHEELS produced under positive density control . . . guaranteed to stay on the mandrel . . . perfectly balanced . . . easily dressed . . . hold their shape, is the message punched out in a brochure prepared by Chicago Wheel & Mfg. Co. 88 drawings with dimensions, prices, wheel numbers and mandrel sizes, are included.

Circle No. 129 on Reader Service Card.

HEAVY DUTY POSITIONER, the new PM-1051 work positioner, a one-ton capacity, fully powered machine is described in a bulletin available from Boesch Mfg. Co., Inc. Features, controls, range of positions, dimensions, and special attachments are described.

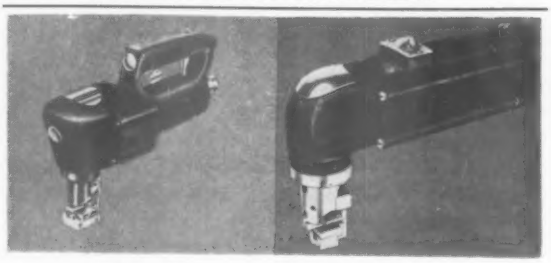
Circle No. 130 on Reader Service Card.

NEW SILICON RECTIFIER WELDERS introduced by Westinghouse Electric's Welding Division is described in literature available. Complete line of 200, 300, 400 and 500 amp welders (230/460 volts and 60% duty cycle) are featured. Type WS welders have virtually no moving parts.

Circle No. 87 on Reader Service Card.

PIPE WELDING CLAMPS made by Jewel Manufacturing Co. are the subject of a handy, 6-page pocket-size brochure. Described and illustrated are pipe, elbow, flange and angle clamps and a pipe marker. Sizes and prices are given.

Circle No. 45 on Reader Service Card.



Model HN Model LN

CUT YOUR METAL CUTTING COSTS 75%, USE THE FENWAY POWERFUL, PORTABLE NIBBLER WITH THE BIG PUNCH

INCREASE PRODUCTION! Save Metal Waste!
Eliminate Finishing Operations!

Portable FENWAY NIBBLERS (air powered or electric) are easily moved to the cutting job (wt: 8-13 pounds according to model)—You can cut up to five feet per minute without distortion. Your metal waste is cut to a minimum—No grinding or buffing to finish off. Fenway Nibblers cut up to 8 gauge mild steel or 10 gauge stainless. Easily converted to cut corrugated sheeting, small diameter ducts, formed sheet metal pipe, tough pitch or asbestos coated corrugated steel—consistent smooth edges, no curling, no chipping, no flaking. Investigate this powerful, durable time saving nibbler. Easy to handle, minimum maintenance, unconditionally guaranteed.

WRITE TODAY FOR FREE DEMONSTRATION
FENWAY MACHINE CO., INC.,
3107 N. Broad St., Phila. 32, Pa.

For More Information Circle No. 30 on Reader Service Card.

AUTOMATIC WELDING machinery made by Airline Welding & Engineering is the subject of Bulletin No. 5-12-57. Featured are multi-purpose machines and positioners for use with all welding processes. Specifications are given. Also featured is a welding planishing machine or cold working and smoothing fusion welds.

Circle No. 131 on Reader Service Card.

HORN PRESSES are the subject of 12-page Bulletin No. 52170A available from the Federal Machine and Welder Co. The new bulletin illustrates and describes the Warco line of horn presses in capacities from 50- to 200-tons inclusive.

Circle No. 132 on Reader Service Card.

HEAT-PROOF protective coatings are the subject of 4-page bulletin offered by Markal Company. The bulletin lists detailed information on four different types of protective coatings that meet many temperature and corrosive conditions.

Circle No. 133 on Reader Service Card.

MOTOR DRIVEN SINGLE BRIDGE cranes are described and illustrated in an 8-page Bulletin No. DH-445B, from the Wright Hoist Division, American Chain & Cable Company. The bulletin includes complete specifications, weights, and dimensions.

Circle No. 134 on Reader Service Card.

VERSATILE heat processing furnaces, featuring high velocity heat flow in electric and gas-fired models, are described in new literature published by Despatch Oven Co. Illustrated booklet gives specifications on "H" and "HT" series, including dimensions, capacities, fan and motor size and other pertinent details.

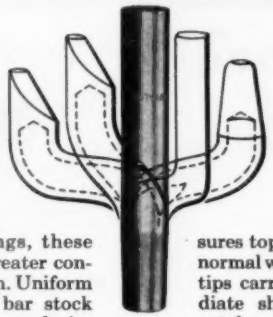
Circle No. 135 on Reader Service Card.

PORTABLE NIBBLER is the subject of two-color one-page data sheet offered by the Fenway Machine Company, Inc. The data sheet gives information on cutting corrugated sheet, small diameter duct, and formed sheet metal pipe.

Circle No. 30 on Reader Service Card.

For More Information Circle No. 78 on Reader Service Card.

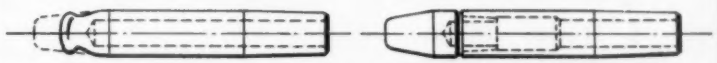
Are You Yet Using Cast Tips?



TUFFALOY
Cold-Formed Tips Are The Answer

Compared to castings, these Tuffaloy tips show greater conductivity and strength. Uniform high quality of the bar stock from which they are made insures top performance under all normal welding pressures. Many tips carried in stock for immediate shipment. See Tuffaloy catalog for this wide selection.

TUFFALOY® Spotwelding Tips



Are You Throwing Away 90% of Worn, Mushroomed Tips?

With Tuffcap®, You Replace Small Tip only, Re-use Shank

With care Tuffcap shanks outlast many Tuffcap tips, interchangeable in four standard nose designs. Tips are easily replaced, reducing holder wear and down-time of machine.

Tuffaloy resistance welding alloy products are widely available through Airco and Tuffaloy representatives. Call on them for SPOTWELDING TIPS (Standard, 'Tuffcap', Cold-Bent, and Special), Holders and Adapters, BAR STOCK, FORGINGS, SEAM WELDING WHEELS, and all other welding alloy needs. Ask for Catalog and Price List.

AIRCO®
AIR REDUCTION SALES COMPANY
A Division of Air Reduction Co., Inc.
150 East 42nd Street, New York 17, N.Y.

Over 55,000,000
THERMO FILTER PLATES and COVER LENS Have Been Sold

WHY?

Because—

- There's a type to insure controlled vision for ANY job!
- Costs less per welding foot than ANY other cover lens.
- Being Precision made and shatterproof they last longer and insure against eye strain.
- For over 15 years THERMO has led in sales and usage.

Ask ANY Welding Supply Dealer or write direct for complete descriptions.

THERMACOTE COMPANY
108 So. DeLacey Street, Pasadena, California

Circle No. 77 on Reader Service Card.

TILLMAN
GLOVES-GARMENTS

WELDORS BUY FROM YOUR DEALER

WELDING GLOVES MITTENS AND GARMENTS NOW IN POLY BAGS

BRAZILIAN DEERSKIN THE "STAY SOFT" LEATHER GLOVES AND MITTENS

John Tillman & Company
1561 W. 19th St.
Long Beach, California

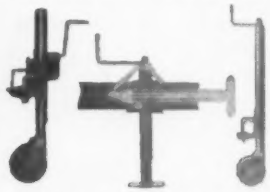
Circle No. 75 on Reader Service Card.

a constant source of business for you . . .

A complete line of - Axle Assemblies, Trailer Undercarriages, Farm & Trailer Jacks, Implement & Trailer Couplers, Spindle End Assemblies

BULL DOG AXLE ASSEMBLIES

BULL DOG JACKS



BULL DOG COUPLERS

A COMPLETE LINE OF COUPLERS

SPINDLE END ASSEMBLIES

Complete Spindle End Assemblies for 2,500, 4,000 and 5,000 lb. capacities Per Pair. Available in complete assemblies or individual parts — Spindle Ends, Hubs, Wheels.

Contact our engineering department for full details on your particular application — a FREE service to you — write for Catalog. 18P.

HAMMER BLOW TOOL CO.
WAUSAU • WISCONSIN

Circle No. 37 on Reader Service Card.

New Porta-Press

Announced by Modern Mfg. Co., Inc. is this 15-pound portable electric punch press designed to punch out round, square, rectangular or any shape hole by merely changing punch and die.

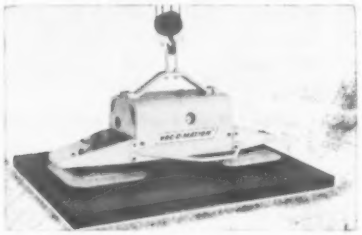
The Porta-Press can be used on stainless steel, brass, plastic and all other materials up to 1/8" capacity. It can also punch out holes in laminated or welded sheets not exceeding 1/8" in thickness.

Circle No. 178 on Reader Service Card.

Wire Wheels

A new line of wire wheels for bench and portable grinders, and wire cup brushes for disc sanders is announced by the Skil Corporation. Each wheel and cup brush is balance-checked and densely filled for perfect balance and longer life.

Circle No. 179 on Reader Service Card.



Vacuum Lifter

A new square cup vacuum lifter for handling steel and nonferrous plates has been introduced by Vac-u-mation Division F. J. Littell Machine Co.

Units come in 1-, 2-, 4-, and 8-cup lifters. Each cup has a lifting capacity of 1,000 lbs. with a 4 to 1 safety factor. The twin cylinder, dry-piston-type vacuum pump used operates periodically to maintain a vacuum of between 20 to 25 inches in the reserve tank.

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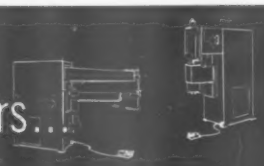
an important message to **MAKERS** and users...



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Neoprene seals make Hercules oil-tight! Explosion- and water-proof NEMA-IV enclosures also available. Forty stock Hercules models to choose from in both momentary and maintained styles.

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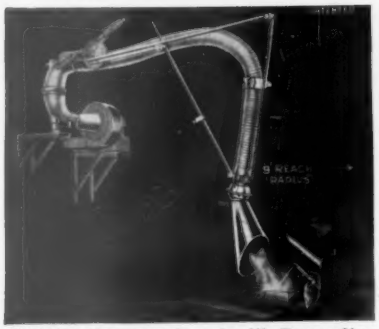
Remove Welding Fumes at the Source... with RUEMELIN FUME COLLECTOR



Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated AT THEIR SOURCE. Improves working conditions . . . lessens fatigue . . . paves the way for increased plant production. Especially helpful in winter months when windows and doors are closed.

Note the new spring-loaded counterbalance mechanism which makes Fume Collectors much easier to handle.

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Light in weight, yet sturdy and rust-proof. Assembles in 5 minutes — no threads. Folds flat. Dozens of uses — welding curtain, machine screen, grinding shield, wall curtain, etc. Available in all sizes. Ask your dealer or write us.

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Milwaukee Distributor Expands Facilities

MILWAUKEE, WISCONSIN: To provide for increased warehousing and a larger service department, Norton, Inc., is spending more than $100,000 for a new building and equipment. Roy Norton, president, said the offices and warehouses would be located here in a new building at 4115 N. Port Washington Rd. and will have four times the floor space available in present quarters at 3876 N. Port Washington Rd.

At the same time, Mr. Norton announced that his firm has been appointed a distributor for Hobart Bros. Co., Troy, Ohio.

R. C. Mahon Builds West Coast Plant

LOS ANGELES, CALIFORNIA: Steel is being fabricated and erection will soon start on the new R. C. Mahon Company's $3½ million West Coast plant facilities here. A 200,000-square foot manufacturing building and a 10,000-square foot combined administration-engineering building are scheduled for completion before the end of the year. Manufacturing operation will start by the first of December.

Brennen, Bucci & Weber Changes Name and Address

BROOKLYN, N. Y.: A change in name and address to Bren Weld Corporation, 5114 Third Ave., Brooklyn 20, New York, has been announced by Brennen, Bucci & Weber, Inc. The firm, which manufactures arc, spot and butt welders, was formerly located at 262 Mott St., New York City.

Eutectic Announces Expansion Plans

FLUSHING, NEW YORK: A number of developments affecting the growth and progress of Eutectic Welding Alloys Corp. has been announced by R. D. Wasserman, president. They include a new Foundry and Metallurgical Division to be built adjacent to the Company's European Welding Center in Switzerland, an expansion of facilities at Company headquarters in Flushing and the opening of a Service Center-Warehouse in Hawaii.

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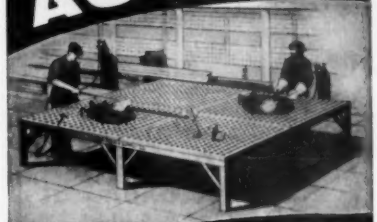
ACORN



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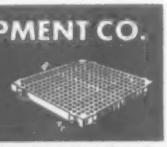

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R.W.A.A. *continued from page 14*

the means of working together to advance progress in their segment of the welding industry.

Working together for many years as the Alloy Group of the Resistance Welder Manufacturers' Association, the electrode manufacturers organized the Resistance Welding Alloy Association in June, 1956.

By-laws of the group state this objective: "To promote friendly relations among those in the industry and in related industries to the end that the interests of the welding industry and its customers shall be better served."

This may sound like the Golden Rule applied to industry, but we know it to be an excellent precept. Let's make it work!

N.W.S.A. *continued from page 14*

by the N.W.S.A. is worth repeating and publishing at every opportunity:

1. The foundation of business is confidence, which springs from integrity, fair dealing, efficient service and mutual benefit.

2. Members should strive at all times to maintain cordial and friendly business relations with all persons associated directly or indirectly with our industry.

3. Members should practice fair and honorable competition and at all times try to establish higher ideals of business morality.

4. No member should make false and disparaging statements or circulate harmful rumors about a competitor.

5. Members should conform to the written sales and merchandising policies of their suppliers.

6. Members should provide and maintain workmanlike and efficient places of business with adequate service facilities for their customers.

7. Members should not seek to engage the services of another member's salesmen for the purpose of weakening that member's sales organization.

8. No member—individually or collectively—should engage in any practice contrary to law or to the public welfare.

9. Under no circumstances should overselling or underselling be tolerated. The customer should at all times be given the benefit of the company's qualified experience and counsel in selecting supplies and equipment best suited to his requirements.

10. Sales to customers should be made so that all parties benefit mutually; terms should be faithfully carried out.

11. All advertising by members should be based on facts with no misrepresentation of their products, prices or business policy.

Users of welding equipment can and should expect the benefits derived from this code of ethics when doing business with N.W.S.A. members.

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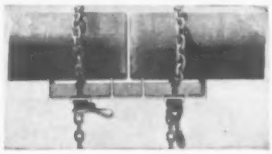
SEE JEWEL FOR . . .



The JEWEL Pipe Clamp
. . . aligns and holds pipe for tacking. Two sizes: ½" to 8" and 8" to 16". Sturdy construction for hand usage.

The JEWEL Elbow Clamp
. . . lines up welding elbows from 2½" to 8" at right angles to the pipe and holds them until tacked.

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. . . marks a perfect hole and saddle on any pipe up to 20".

The JEWEL Angle Clamp
. . . holds branch line at right angles to the main or headers. Takes any size main or branch from ½" to 12".

The JEWEL Flange Clamp
. . . lines up the flange face at right angles to pipe end and holds until tacked. Takes size from 2½" to 16".

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Improved Efficiency
SILVER BRAZING FLUX

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490

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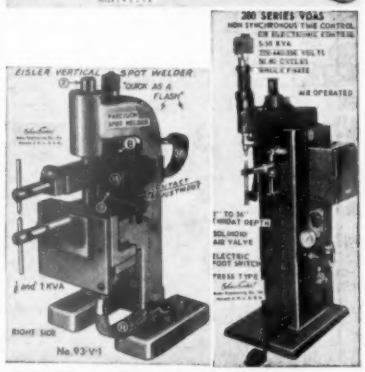

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Local Group Buys M&T Welding Products

OAKLAND, CALIFORNIA: Purchase of all the outstanding stock of M & T Welding Products Corp. by Glenn Industries Corp. has been announced by George G. Glenn, vice president of M & T Welding. The Operating company will be known as the Glenn Pacific Power Supply Corp. Present plant and office facilities at 703 37th Avenue, Oakland, will be expanded.

Wasserman Weds In Switzerland

LAUSANNE, SWITZERLAND: Rene D. Wasserman was married to Miss Rosemarie (Dedette) Roth on Saturday, September 5, at the Chapel of Saint-Sulpice near here. Mr. Wasserman is president of Eutectic Welding Alloys Corp., Flushing, L. I., N. Y.

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For welders who prefer wood handle Tomahawks, Atlas W-H models are tops. "Tough" induction hardened heads, long, thin chipping blades assure maximum life.

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Shear only $495.00
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WELDING CLINIC

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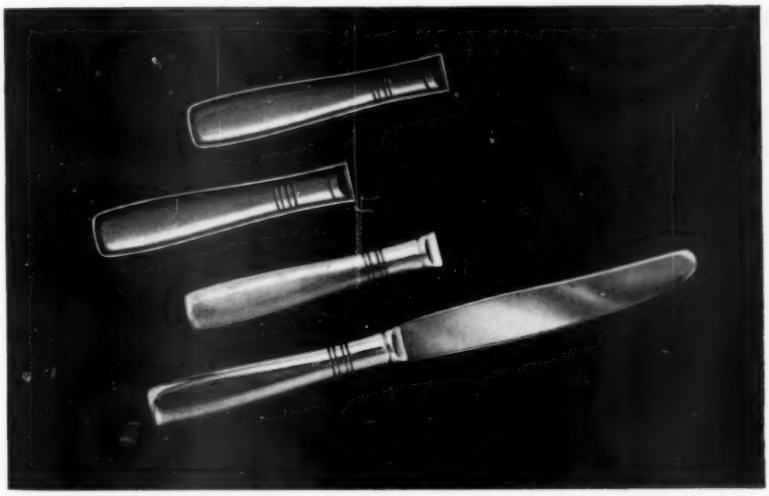
BRAZE WELDING. The filler metals used are Anaconda-997 (Low Fuming) Bronze, Tobin Bronze®-481, and Nickel Silver-828. Their low application temperatures produce distinct advantages for oxyacetylene braze welding, such as excellent control, simple joint and fixture designs needed for efficient production, and low distortion. In addition, when molten, they easily bridge gaps in poorly fitted joints and readily build up fillets and reinforcements to develop maximum joint strengths.



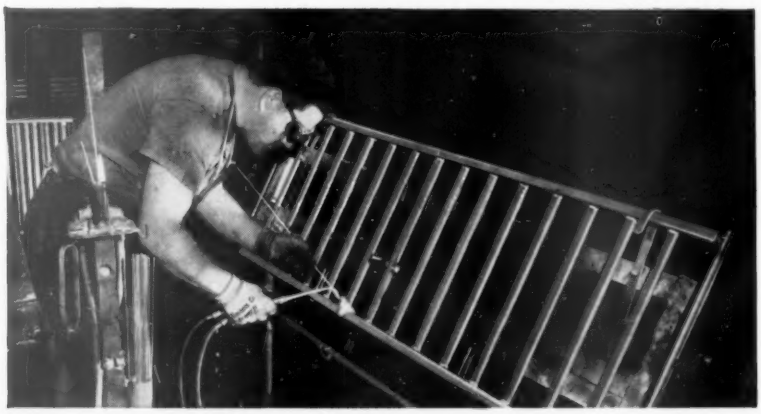
TWO HALVES of stainless-steel knife handles are joined by controlled-atmosphere brazing using Anaconda Nickel Silver-828 Welding Wire at The Imperial Knife Company.

BRAZING. Most of these advantages are also available when the alloys are used for brazing in induction-heating and controlled-atmosphere furnace operations. An excellent example is the manufacture of stainless-steel handles for table knives. Imperial Knife Co. of Providence, R. I., uses Nickel Silver-828 for controlled-atmosphere brazing in production of the knife handles shown at the right, above. High-quality joints are essential for durability and good appearance, and high quality is just what this alloy confers. It develops high strength by making full-section joints, and the polished joints are inconspicuous because the alloy's color is so close to that of the steel.

The 1/16" diameter wire is cut into short lengths which are placed within the hollow handles when their two halves are assembled before entering the furnace. When the brazing temperature is reached, the molten filler metal flows by capillary action between the butted edges to bond the joint completely.

FOR MORE INFORMATION. Anaconda distributors will gladly help in the selection of the exact rod for your job. Or write for a copy of Publication B-13. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

5928



SIDE OF A HOSPITAL BED being assembled at Simmons Co., Kenosha, Wisc., by braze welding with Anaconda-997 (Low Fuming) Bronze Welding Rod.

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WELDING RODS
Made by
The American Brass Company

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